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A FEASIBILITY STUDY ON CONSOLIDATING  
AIR FORCE COST REDUCTION PROGRAMS

THESIS

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AFIT/GCM/LSY/92S-4

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**AFIT/GCM/LSY/92S-4**

**A FEASIBILITY STUDY ON CONSOLIDATING  
AIR FORCE COST REDUCTION PROGRAMS**

**THESIS**

**Presented to the Faculty of the School of Systems and Logistics  
of the Air Force Institute of Technology  
Air University  
In Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science in Contract Management**

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**September 1992**

**Approved for public release; distribution unlimited**

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Abstract

The rising cost of defense acquisitions combined with the shrinking size of the defense budget now makes government cost savings programs more vital then ever. The Air Force employs three primary cost saving programs. These programs are the Industrial Modernization Incentive Program (IMIP), the Manufacturing Technology Program (MANTECH), and the Value Engineering Program (VE). Each of these programs has its own set of rules and regulations that govern its use.

The B-2 System Program Office (SPO) sought to improve the effectiveness of its cost savings effort by combining each of the separate cost savings program into one consolidated effort called the Cost Reduction Initiative (CRI) Program.

The goal of this research is to identify if there are benefits to the government from a consolidation of Air Force cost savings programs, and if there are benefits, is it feasible to consolidate these programs? To answers these questions, this research first investigates the problems with cost savings programs identified in current literature. Second, the research explores all the conditions surrounding the B-2's effort to consolidate its cost savings programs. Finally, the research investigates if Air Force program and manufacturing directors have problems with cost savings

similar to the problems identified in the literature review and by the B-2 SPO. Also, their reluctance or acceptance to a consolidation of cost savings efforts on their programs is explored.

Through an in depth case study of the B-2's consolidation effort and telephone and personal interviews with selected Air Force program and manufacturing directors, comprehensive answers to the above questions will be addressed.

Results of this research revealed that there are problems with current cost savings programs that can be addressed through a consolidation of cost savings efforts into one concise program. This research also indicated that a consolidation effort would have support from the program and manufacturing director community.

## A FEASIBILITY STUDY ON CONSOLIDATING AIR FORCE COST REDUCTION PROGRAMS

### I. Introduction

Department of Defense acquisitions are now facing serious funding challenges. With the current downsizing of the defense budget, there will be fewer dollars available for acquisitions of new systems. In addition to the scarcity of funds caused by downsizing, the cost growth of new systems has increased dramatically. There are many examples of how expensive defense acquisitions have become. The Air Force's new cargo aircraft, the C-17, is budgeted for \$4.2 billion in 1993 for twelve aircraft. The cost of the total program that includes 120 aircraft is \$35.2 billion (Gilmartin, 1991:82). Another example of this growth is the B-2 program, which was initiated at a total cost of \$70 billion and yielded a per unit cost of \$686 million. Currently, the B-2 program is priced at \$44 billion, yielding a per unit cost of \$2.2 billion (Hepler, 1991). Finally, the new Advanced Tactical Fighter the Air Force is procuring has been estimated to have a total program cost of \$98 billion (Bond, 1991:20). It must be kept in mind that these high price tags are existing in an environment of shrinking budgets. The Pentagon has cut its 1993 budget in constant dollars by \$10.36 billion and its

1992-1997 total by \$63.8 billion (Bond, 1992:21). With shrinking defense budgets and skyrocketing price tags, available government cost reduction programs are needed now more than ever in order to improve manufacturing efficiency and effectiveness.

This research examined Air Force cost reduction programs used on major weapon systems acquisition. It also assessed the problems associated with each of these activities. Based on the assessment of these problems, this research explored the potential benefits to the Air Force of consolidating its cost reduction initiatives. To understand the impact of consolidation on an organization, the effort by the B-2 System Program Office to consolidate its cost savings programs into one unified program will be researched.

Just because potential benefits can be realized by a consolidation of the different savings programs, doesn't mean that it is possible to combine these programs into one organization. Therefore, this paper will explore the feasibility of incorporating this effort into the current acquisition environment.

## General Issue

The United States Air Force employs three major manufacturing cost reduction programs for acquisitions. These programs are the Industrial Modernization Incentive Program (IMIP), the Manufacturing Technology Program (MANTECH), and the Value Engineering Program (VE). Each of these initiatives currently exist independently with separate ground rules and assumptions. In addition, each program has problems associated with their use.

Briefly, IMIP has had several problems associated with its use. IMIPs have experienced difficulty in validating project savings (Glowacki, 1988:21). They have also realized long delays between program phases caused by inconsistent guidance and a lack of understanding of the program by government contracting personnel (Webber, 1991:3-5). In addition, there is a general lack of high level support for the program (DoD IG, 1989:5).

The MANTECH program has experienced similar problems. There is a lack of understanding of the MANTECH process by government personnel that causes long delays in the process (Zacchero, 1991). Like IMIP, the MANTECH program also has experienced difficulty in validating the savings that are generated by individual projects. MANTECH also has problems with inconsistencies in funding over the life of projects. (Pearl, 1992)

Value Engineering, like the above two programs, employs complex contractual language which deters understanding by both government and contractor personnel (Ogilvie, 1986:12). The VE program also experiences very slow processing times due to the program complexity (Bowers and others, 1990:10). It has a lack of consistency in funding and has a lack of high level support (Ogilvie, 1986:12).

The B-2 System Program Office recognized the problems associated with each one of these programs and sought to solve them by combining the three programs into one activity with streamlined, common ground rules and assumptions. Before the total number of B-2 aircraft was cut from 102 down to 20, the cost reduction program had generated projected savings of over \$4.4 billion for the life of the acquisition (Hepler, 1991).

In our world of rising costs and shrinking budgets, any possibility of consolidation and streamlining similar to the B-2's cost reduction program needs to be explored. This research explores the feasibility and possible benefits from a consolidation of cost reduction programs.

### Specific Problem

The purpose of this research is to identify if there are benefits to the government from a consolidation of Air Force cost savings programs. If there are benefits, is it feasible to consolidate these programs?

### Investigative Questions

To determine if there are benefits to the government from a consolidation of Air Force cost savings programs, and the feasibility of a consolidation, the following questions were addressed:

1. What problems are identified in current literature with each of the Air Force cost savings programs?
2. What were the conditions that surrounded the B-2's effort to consolidate its cost savings programs, including motivation, implementation problems and results?
3. Are the problems with cost savings programs identified in the literature review confirmed by Air Force program and manufacturing directors on current cost savings programs, and would these directors support or resist a consolidation of cost savings efforts on their programs?

## Overview

This chapter reviewed the challenges in store for government acquisitions and stressed the need for effective, efficient cost savings programs.

In the next chapter, the literature review examines the cost savings programs that are being analyzed in this thesis. It defines each of the programs, reviews how each of the programs are implemented, and discusses some of the problems that are encountered. This chapter answers research question one.

Chapter III examines the methodology used to conduct this research.

Chapter IV analyzes the data that were gathered from interviews. This data summarizes respondent answers to the investigative questions discussed in Chapter III and answers research questions two and three.

Based on this analysis, the final chapter provides conclusions and recommendations.



## II.Literature Search and Review

### Introduction

This literature search and review examines the major cost reduction programs used by the Air Force: IMIP, MANTECH, and VE. This review also details the process that is involved with the use of each program and seeks to identify the problems that are associated with their implementation and administration. When the B-2 Program Office consolidated each of the available cost savings programs into one streamlined activity, the program office was attempting to avoid the problems presented by using each savings program individually. With a strong understanding of the difficulties these programs represent individually, the possible benefits and feasibility of a consolidation of these programs can be better understood.

## Cost Reduction Programs

Industrial Modernization Incentive Program. "IMIP is a contractual tool for initiating new technologies into major DOD contractor facilities. The intent of IMIP, is to enhance productivity, improve quality and reduce acquisition cost" (DOD 5000.44-G, 1986:i). IMIP encourages contractors to develop high-risk manufacturing technologies, and shares the cost savings resulting from the contractor's innovations (Scott, 1988:85).

IMIP Objectives. IMIP was developed in 1982 to expand and broaden the Air Force's Technology Modernization Program (Hawk, 1986:38). The program was developed because a significant portion of defense manufacturing was being done in an environment characterized by outdated, inefficient, and labor-intensive capital equipment (DOD 5000.44-G, 1986:1-1). IMIP encourages defense contractors to make long-term capital investments to improve the productivity of their factories (Stimson, 1986:33).

"Just as productivity has become a paramount industrial concern in non-defense sectors, so too has the achievement of increased manufacturing efficiencies in defense contractors become of paramount concern to the DOD" (DOD 5000.44-G, 1986:1-1). There have been several IMIP success

stories accomplished in the last ten years. Group technology for Textron Lycoming became the organizational backbone of an 8-year, \$60 million makeover that was supported by IMIP (Prosen, 1990:81). Application of IMIP at Westinghouse Defense and Electronics Center involves minimizing direct labor, material handling, and maximizing process yield and integration of systems (Engwall, 1986:47). Other major contractors have taken advantage of the programs as well. They include, but are not limited to, General Dynamics, LTV, Martin Marietta, IBM, and Boeing. Government estimates predict that cost savings are expected to reach \$6.3 billion industry wide throughout the 1990s (Scott, 1988:88).

Government to contractor incentive methodologies, such as IMIP, are viewed as a way to create win-win situations for both the government and defense contractors, thereby satisfying the goals of each (Acker, 1989:24). It is a government/industry partnership which incentivizes contractors to bring together advanced productivity enhancing technologies and the investments necessary to modernize their organizations and facilities. The result is a share of the cost savings to the government, while the contractor enjoys increases in profits from the cost reduction programs through IMIP (ASD IMIP Guide, 1990:1-1).

IMIP may be initiated in any one of four ways. First, it can be a requirement contained in a weapon system program's request for proposal. Second, it can be achieved through mutual Air Force/contractor agreement during the performance of an Air Force contract. Third, it can be initiated through a sources sought synopsis, request for proposal, or competitive process. Fourth, it can be proposed by a contractor through an unsolicited proposal. (ASD IMIP Guide, 1990:2-4)

IMIP Phases. The foundation of IMIP is broken up into four phases. The first phase of IMIP is Phase 0, or the Planning stage. During this phase, a Memorandum of Understanding (MOU) is developed between all participating parties. The MOU establishes in writing the working relationship between the affected parties. The MOU is the foundation upon which a business agreement is developed (ASD IMIP Guide, 1990:2-5). At this point, the government and the contractor are trying to determine if an IMIP would be beneficial to the two parties. A proposal is usually submitted by the contractor that shows the Air Force the potential benefits, both technical and financial, which may be derived from IMIP (ASD IMIP Guide, 1990:2-13).

During Phase I, a top-down factory analysis is performed by the contractor to identify where potential cost reduction programs could be implemented. This is an opportunity for the company to take a critical look at the operation and identify the cost drivers. From this phase comes the "shopping list" of potential IMIP projects which

will be evaluated for possible development funding (Grabits and others, 1990:10).

Phase I typically consists of a structured analysis of the total manufacturing system that evaluates the needs of the overall factory and identifies potential manufacturing technologies and modernization opportunities.

"The analysis should include: a review of current operations, identification of current cost drivers, identification and prioritization of potential productivity improvements, development of conceptual work cell/center designs, a plan for technology development, development of tools for demonstrating/validating savings, and a plan for total integration of all factory equipment and systems". (DOD 5000.44-G, 1986:1-8)

Government/contractor sharing of savings is the primary IMIP contract incentive. During Phase I, the government and contractor will negotiate a share ratio from the cost savings as a part of the business agreement. This portion of the IMIP savings is referred to as a Productivity Savings Reward (PSR). IMIP government benefits are referred to as "savings" when current contract prices are reduced, and as "cost avoidance" when they apply to contracts yet-to-be-priced (Grabits, 1990:11).

Incremental savings are determined by establishing pre-IMIP (As-Is) and post-IMIP (To-Be) baselines for each category of savings. As-Is data reflects the current situation, without IMIP. To-Be reflects the impact on production of the IMIP project implementation. The projected

savings and associated expenses/investment data are input to a discounted cash flow model. The contractor incentive is determined such that a negotiated rate of return on investment is achieved (ASD IMIP Guide, 1990:5-2).

Phase II is called the Project Development phase. This phase of the IMIP requires a contractual commitment. If project maturity permits, the project can skip phase II and move directly into phase III. At this time, individual projects requiring funding for study, development, validation, or testing are processed before they can be committed to the shop floor (Grabits and others, 1990:10). Phase II includes tailoring new technology and equipment to a specific application and development of detailed implementation plans for the IMIP projects. These activities are sometimes referred to as "applications engineering" or "systems integration." The validation consists of verification of specific applications and performing a cost-benefit analysis for each IMIP project (DOD 5000.44-G, 1986:1-8). Projects that are selected for Phase II will go through a continuous criteria check to insure there is a high potential for cost savings. Only those projects which continue to show potential for success will advance to Phase III (ASD IMIP Guide, 1986:2-9).

Phase III is the investment and implementation phase of the program. This phase generally consists of incorporating

IMIP projects into the contractor's facility (DOD 5000.44-G, 1986:1-8).

"In essence, the final IMIP business agreement is determined, the capital equipment is purchased and installed, engineering changes are completed, production integration is complete, and the operational milestone is met, signaling the end of the IMIP portion of the implemented cost reduction". (Grabits and others, 1990:11).

Phase III is also that period when the IMIP program generates incentives to the contractor and savings to the government (ASD IMIP Guide, 1990:2-9).

Contractors should be prepared to use their own funds for improvements. "Modernization is first and foremost an industry responsibility. Therefore, contractors should conduct IMIP efforts without government funding" (DOD 5000.44-G, 1986:1-13). However, when it is in the best interest of the government, funding may be provided by the government (DOD 5000.44-G, 1986:1-8). In many cases, the government will participate in the funding of the development stages of projects and require the contractor to provide the funding for implementation (Hepler, 1991).

IMIP Problems. The Industrial Modernization Incentive Program has several problems associated with its current use.

The first problem, indicated within current literature, is the lack of ability to validate IMIP program savings.

Capt David Glowacki in his masters thesis on IMIP in 1988 observed that the most serious problem in the IMIP process was the lack of a method to effectively evaluate IMIP projects and substantiate associated savings (Glowacki, 1988:21). A 1989 report from the DoD Inspector General also indicated that the inability to account for savings was one of the big draw backs of IMIPs (DoD IG, 1989:4). The IG report gave the following illustration of the problem:

The Navy and the Air Force did not adequately validate \$455 million of claimed projected savings for four of the five program efforts reviewed. Documented program savings were not reflected in reduced contract costs of weapon systems. (DoD IG, 1989:4)

In a 1986 study conducted by the Logistics Management Institute, the need to project and validate program benefits to ensure the government doesn't pay more than its fair share was clearly identified as a major problem within the IMIP process (Gottschalk and McCennon, 1986:17).

In addition to the problem of savings validation, the extremely long delays between IMIP phases has caused difficulties within the IMIP program. In a study conducted by Technology Transfer Incorporated, the delays between phase one and two of IMIP projects were major negative factors in the successful completion of individual projects (Schafrik and Fiorino, 1991:30). Lengthy lead times between program phases was also cited as a weakness within the Industrial Modernization Incentive Program in a report by



the Air Force Systems Command (AFSC) IMIP focal point, Jim Webber, to the commander of AFSC (Webber, 1991:3-5).

Other significant problems for IMIPs included in the available literature identify the absence of consistent guidance and high level advocacy. Glowacki's research indicated a clear need for centralization of policy and guidance for IMIPs along with standardized procedures. He also indicated a clear need for higher support in the DoD for IMIPs (Glowacki, 1988:22). This need for higher levels of advocacy for IMIPs was repeated by the DoD IG 1989 report which noted the lack of OSD level support and guidance for IMIPs and recommended enhanced levels of commitment and oversight from this level (DoD IG, 1989:5).

Manufacturing Technology. Manufacturing Technology is another program used by the Department of Defense (DoD) and the Air Force to help reduce cost and improve the United States defense industrial base. The U.S. Air Force Manufacturing Technology Program is governed by AFR 800-33, Acquisition Management, Manufacturing Technology Program, which provides the following definition of the program:

MANTECH is a program which consists of all actions taken by the Air Force to develop and carry out new or significantly improved production systems, processes, techniques, or equipment for use (near or long range) in contractor facilities or Air Logistics Centers in support of Air Force systems, subsystems or equipment. (AFR 800-33, 1982:1)

MANTECH Objectives. MANTECH programs are designed primarily to bridge the gap between laboratory development of advanced technology and the implementation of this technology onto the factory floor. Therefore, MANTECH projects are more developmental in nature than IMIP projects which seek to implement previously developed technology (Grabits, 1990:11).

Although it is the DoD's policy to depend on investments from the private sector in our free enterprise system to provide the necessary technology for DoD acquisition, the MANTECH program is designed to improve the effectiveness of the defense industrial base. Government investment through the MANTECH program will only occur when the defense industry can not or will not commit the funds to maintain the necessary levels of technology to support current and future DoD acquisitions (DODI 4200.15, 1985:1).

In addition, another primary feature of the MANTECH program is that it provides defense contractors the security they need to pursue capital investment and industrial innovation to develop high risk technology (DODI 4200.15, 1985:2).

According to Major Charles Zacchero, who has managed the MANTECH programs for both the B-2 and Cruise Missile Program Offices at the Air Force's Aeronautical Systems Division, a standard business agreement is developed between

the government and defense contractors for MANTECH projects. The agreement is used so the government will provide all development costs. In many cases, Air Force laboratories will also provide specific development data or hardware. The contractor will provide all capital expenditures. Upon successful implementation of a MANTECH project, the government reaps all cost savings associated with the newly implemented technology on any current contracts, and the contractor keeps the new technology to enhance their competitive capability (Zaccherio, 1991).

One of the primary benefits of MANTECH programs is the dissemination of technical information generated from MANTECH projects throughout industry. AFR 800-33 provides the following description of this dissemination:

Consistent with national security considerations and technology export guidelines, the results of Air Force sponsored MANTECH projects will be issued throughout industry as well as to appropriate government and industry organizations in sufficient detail to foster industry wide adoption beyond initial demonstration. (AFR 800-33, 1982:2)

This transfer of information lets any United States company, no matter how small or large or financially capable, benefit from government sponsored MANTECH programs (Grabits, 1990:11).

To facilitate this flow of information, the Department of Defense has developed three organizations. The first is the Manufacturing Technology Advisory Group (MTAG). MTAG is

responsible for coordinating the MANTECH efforts between the services. They facilitate this goal through seminars, publications, and conferences. Next, is the Manufacturing Technology Information Analysis Center (MTIAC). MTIAC is responsible for collecting, analyzing, and disseminating all MANTECH generated data. The final organization is the Defense Technical Information Center (DTIC). DTIC is the library for all published MANTECH final reports (Grabits, 1990:11). All these above organizations allow for the widest dissemination of new MANTECH technology.

The implementation of a MANTECH program requires cooperation from both the government and contractors. The government responsibilities associated with a MANTECH program are similar to the responsibilities the government has in administering an Industrial Modernization Incentive Program, where the government must perform a complete technical and financial review of each project (Zaccherio 1991). Government organization responsible for MANTECH projects will verify contractor claims and validate associated benefits. The government also validates the comparison of the new process against the system, process, technique, or equipment being replaced (AFR 800-33, 1982: 2).

Once a MANTECH proposal has been submitted, either by contractor or government initiation, the contractor is

responsible to conduct and submit with their proposal of the new technology the results of a literary and patent search as well as a review of DoD MANTECH past project results, ongoing work, and planned efforts. The search will ensure a review of available technology to prevent duplication and enhance dissemination of MANTECH data (AFR-800-33, 1982:2).

In addition to the above responsibilities, the contractor is required to provide, for government review, applicable data regarding cost benefit analysis of the "as is" situation against the "to be" situation and all specific data necessary to thoroughly review the project technically (DoDI 4200-15, 1985:3). Following the government review, the government organization notifies the contractor of their approval/disapproval of the proposal (Zaccherro, 1991).

An effective MANTECH program can help improve the quality and timely delivery of DoD acquisitions. It can also insure that new technologies are developed to reduce DoD acquisition costs. It bridges the gap between the laboratory and the factory floor, and it helps ensure industrial innovation is stimulated (Grabits, 1990:10).

MANTECH Problems. Like IMIP, there are several problems that are inherent in the Manufacturing Technology program. MANTECH projects do not enjoy a great deal of understanding and cooperation from the contracting community

as a whole (Zaccherro, 1991). The contracting process should be streamlined to enhance getting projects implemented so they can begin to generate savings as soon as possible. In addition to the contracting concern, there is a concern that the MANTECH program could improve its usefulness by enhancing its technology transfer of developed projects to generate savings on multiple programs. This would require government personnel to force participating contractors to comply with the technology transfer requirements (Zaccherro, 1991).

In addition to the concerns identified above, Capt Scott Pearl the MANTECH focal point for Air Force Systems Command Headquarters (HQ/AFSC), indicated several other problems with the MANTECH program. Capt Pearl identified the uncertainty of funding for MANTECH projects as a general concern. When funding is uncertain or delayed, this causes stretch outs or descoping of projects which have a negative impact on savings. With MANTECH projects enjoying an average cost avoidance ratio of 12 to 1, it is easy to see how delays caused by funding uncertainty would impact the possible savings. In addition to this issue, Capt Pearl indicated a concern with the cost validation required on MANTECH projects. In situations where costs of validating exceed savings of the project, some measure of common sense needs to be available to keep the project a saver and not

allow the validation to totally eliminate the benefits. Finally, Capt Pearl took issue with the IMIP style of savings validation for MANTECH projects. This method of savings validation looks at the "as is" situation and compares it to the "to be" situation. In many cases, there is no "as is" situation in a MANTECH situation because MANTECH projects are often pioneering brand new technologies with no associated "as is" condition (PEARL, 1992).

Value Engineering. Value Engineering (VE) is one of the acquisition tools the Air Force uses to help reduce costs and improve quality on their large procurement.

VE Objectives. The Value Engineering program is governed by AFR 320-1, Air Force Value Engineering Program, which provides the following definition of VE:

VE is a sequential process for systematically analyzing high cost areas of functional requirements for DoD systems, facilities, procedures, processes, operations, maintenance, and materials to achieve essential functions at the lowest life cycle cost without degrading needed performance, reliability, quality, maintainability, and safety. (AFR 320-1, 1985:1)

In layman's terms, VE is a process where engineers take a second look at a design, eliminate inefficiencies and strip down a system to identify the simplest and most economical design that will satisfy the initial requirements (Cleveland, 1990).

Value Engineering has been used for over 40 years. The concept of Value Engineering was introduced after World War II by Westinghouse (Goldstein, 1988:105). The first formal military VE program was implemented by the Navy in 1957 and was called Value Engineering because it was staffed with engineers (DoD 4245.8-H, 1986:1-2).

In today's competitive world, Value Engineering is no longer a luxury, but a necessity for program survival, particularly when acquiring major weapons systems for the government (Goldstein, 1988:105).

There are different ways Value Engineering can be exercised by contractors on government contracts. Initially, VE clauses are required on all DOD contracts that exceed a cost of \$100,000 (EN Operating Instruction 320-1, 1988:3). There are two basic types of VE clauses. The first is the requirement clause where all VE activity by the contractor is clearly defined as an item in the statement of work on the contract. The second type of clause is an incentive clause where contractors are encouraged to voluntarily submit their Value Engineering Change Proposals (VECPs) (EN OI 320-1, 1988:4). In a technical report for the Society of Manufacturing Engineers by George Grabits and others, a VECP is defined as a DoD document that contractors use to propose a VE change to an existing contract that will represent savings to the government (Grabits, 1989:13-7).



When Value Engineering is put on contract, there are a great many tasks a contractor must perform. According to MIL-STD-1771A, Value Engineering Program Requirements, the tasks a contractor must perform when VE is on contract initially includes developing a comprehensive Value Engineering plan that describes exactly how VE will be implemented. Second, the contractor must illustrate his organization and all policies and procedures applicable to the VE program. Third, the contractor must identify in detail how he will facilitate training of key personnel in VE methods and techniques. Fourth, specific VE goals, schedules, and levels of effort must be clearly identified. Fifth, all costs of the VE program must be carefully controlled and reported. Finally, there should be a specific plan that identifies how the contractor will flow down Value Engineering provisions to applicable subcontractors (MIL-STD-1771A, 1989:5-6).

The clear objective of these Value Engineering program requirements is to motivate or to require contractors to initiate, develop, and submit complete cost reducing Value Engineer change proposals (DOD 4245, 8-H. 1986:1-3).

Special attention needs to be directed to the implementation of VE projects. The implementation of a VECP is the ultimate culmination of any project, and it is the toughest part of Value Engineering (Goldstein, 1988:108).

There is a resistance from design engineers who see this activity as second guessing their efforts. Cooperation is paramount. Barriers to open communication need to be broken down to enhance implementation by dedicated implementation managers (Goldstein, 1985:108).

With all these requirements, there is still a primary need for top management support to make the program work. According to an article by David Coffield, "Value Engineering: A No Risk Investment," it must be kept in mind that management must support new VE programs 100% to help guarantee success (Coffield, 1990:6.3). VE will not have much impact if top management does not clearly demonstrate its commitment to the program and adopt Value Engineering as a paramount part of the organizational culture (Goldstein, 1988:105).

The government has several responsibilities that are initiated after the receipt of a VECP. Initially, the government contracting officer has 45 days to accept or reject the VECP in part or whole (FAR, 1989:48.1041). The government contracting officer is also responsible for obtaining the appropriate government expertise to evaluate the VECP (Grabits, 1989:13-8). During the 45 day review period, the cognizant government organization must obtain approval by the appropriate configuration change board, notify the contractor of the government's disposition on the

VECP and seek to validate the claimed savings and cost figures through cost benefit analysis performed by government financial resources (EN Operating Instructions 320-1, 1988:6).

Both the government and the contractor realize large productive benefits from an aggressive Value Engineering program. DoD 4245.8-H, Value Engineering, presents the following description of savings that can be generated from the VE program:

Benefits from the DoD VE program are significant. In house savings of approximately a billion dollars a year are being reported. Reported savings from contractor VECP programs are approximately 250 million a year and are expected to increase. (DoD 4245.8-H, 1986:18)

The VE program saves the government money and improves quality of acquired systems. This fact is clearly stated in MIL-STD-1771A which says that the primary benefit the government receives from the VE program is the achievement of the essential functions of a system at the minimum life cycle cost without sacrificing required features, performance, quality, safety, or security (MIL-STD-1771A, 1989:3).

The Value Engineering program also provides several benefits for the contractor. The most obvious advantage is that the contractor improves his profit from his share in the savings that accrue from an implemented VECP (DoD 4245.8-H, 1986:1-8). The Federal Acquisition Regulation

provides specific guidance for the types of sharing arrangements between the contractor and the government. On an incentive or voluntary VE program, the instant contract share rate of savings for the contractor is 50% on fixed price contracts, 0% on incentive contracts, and 25% on cost reimbursement contracts. For concurrent and future contracts, the contractors share is 50% on fixed and incentive contracts and 25% on cost reimbursement contracts. (FAR, 1989:52.248-1) The sharing rates for the contractor change when the Value Engineering program is mandatory. The instant contract is 25% on fixed price contracts, 0% on incentive contracts, and 15% on cost reimbursement contracts. On concurrent and future contracts for mandatory programs, the share rate is 25% for fixed price and incentive contracts and 15% on cost reimbursement contracts (FAR, 1989:52.248-1).

An important secondary advantage for contractors, in addition to their share of the savings on implemented VECs, is the enhanced competitive posture they gain from improved methods and processes (DoD 4245.8-H, 1986:1-8).

In the final analysis, Value Engineering represents the opportunity where the contractor and the government can reap valuable benefits in a win/win situation (Cleveland, 1990).

VE Problems. There are several problems with the Value Engineering (VE) Program that have been identified in the reviewed literature. In a 1986 masters thesis on VE by Raymond Ogilvie for the Florida Institute of Technology, several problems were identified. Initially, he identified the general lack of top management support for the VE program by both the government and contractors. He also noted the difficulty caused by the complex contractual language used by the VE program and the long processing delays caused by both the government and contractors. There is also a clear indication in Ogilvie's research that VE program personnel don't have adequate training to perform their jobs (Ogilvie, 1986:12). In a report to AFIT on VE by Capt Grant Bowers and others, many of the same concerns identified by Ogilvie were echoed. The Bowers report identified the slow processing time for Value Engineering Change Proposals (VECPs) as a problem effecting the VE program. He continued by identifying the lack of financial support as another problem. "Program managers often do not allocate funds to VE efforts on a program" (Bowers and others, 1990:10). The Bowers report continued by identifying the concern that VE proposals may reduce the size of the contracted effort which would result in a lower profit margin for the contractor. This could wipe out any savings a VECP may generate (Bowers and others, 1990:11).

Capt James Holstein, in his masters thesis for the Florida Institute of Technology, identified the same types of problems in the VE program. He found the three major problems with the VE program were the lack of management support and training, the long processing times for individual proposals, and the lack of specific approval and disapproval criteria (Holstein, 1988:15).

#### B-2 Cost Reduction Initiative (CRI) Program

The B-2 System Program Office developed a unique cost reduction program that incorporated aspects of the Industrial Modernization Incentive Program, the Manufacturing Technology Program, and the Value Engineering Program into one comprehensive cost savings program with one set of ground rules that governed all savings proposals (Hepler, 1992).

"While its underlying nature is to improve the overall military-industrial base, the CRI program's major emphasis is focused specifically on significant reductions in the projected cost of the B-2 Weapon System" (Grabits, 1990:MS-14).

The B-2 SPO has eliminated IMIP, MANTECH, and VE as separate activities. All cost savings proposals are evaluated on their individual merit to first reduce program cost and second to enhance the industrial base (Hepler,

1992). Both the prime and subcontractors are encouraged to submit cost savings proposals. Sources of funding for development are determined on a case by case basis, and sharing of savings between the government and contractors is the same for all proposal types and is clearly defined in the ground rules and assumptions of the CRI Program (CRI Guide, 1990:3).

Currently the B-2 CRI Program has enjoyed a great deal of success. Since its inception in 1987, the program has generated over 300 proposals for a total program savings of \$2,2 billion (Hepler, 1992).

#### Literature Review Conclusion

DoD acquisitions are facing rising costs and shrinking budgets. In this environment, the vitality of government cost savings programs is becoming more important than ever before. This literature review outlined the process used by the three major cost savings programs employed by the Air Force and identified problems associated with each of these initiatives. The IMIP has demonstrated problems with savings validation, inconsistent guidance, lack of understanding from government contracting personnel, long delays between program phases, and a lack of high level support. The MANTECH program also has experienced a lack of understanding from government contracting which has caused

delays in program phases. There are also problems in MANTECH with validating savings, and maintaining consistent funding. VE has problems in contractual complexity that cause long delays, lack of government contracting understanding, inconsistencies in funding, and a general lack of high level support.

The B-2 System Program Office sought to improve the effectiveness of its cost savings program by consolidating the activities of the three cost savings programs reviewed into one program with common ground rules and assumptions.

Because of the problems these cost savings programs represent individually, the utility of a consolidation similar to the B-2's effort warrants exploration. Are there benefits to the government in a consolidation of the these cost savings programs, and if there are benefits, is it feasible to join the programs together?



### III. Methodology

#### Introduction

The overall purpose of this research was to identify if there are benefits to the government from a consolidation of Air Force cost savings programs. The literature review presented in the last chapter served to answer the first of the investigative questions associated with this research, namely, what problems are identified in current literature with each of the Air Force cost savings programs? The second objective was to explore the conditions of the B-2 Program's effort to consolidate the available cost savings programs into one vehicle with common ground rules and assumptions. Both the problems the B-2 encountered that led to the consolidation and the pros and cons of this consolidation were investigated. With the cost savings problems identified in the literature and the problems the B-2 SPO identified, the final objective was to investigate if Air Force programs were experiencing similar problems and if a consolidation of cost savings programs would be supported or rejected on their programs.

This chapter explains how the research was conducted to answer these last two objectives. First, the overall research designs will be described, followed by a justification for the methodologies chosen. Next variable

selection and measurement will be described, especially as it relates to the design of the interviews used to gather data. Sample and respondent selection will also be described as well as the interview protocol used. The chapter concludes with a discussion of the limitations of the research methods used.

### Research Design

This research design consisted of two related field case studies. Table 3.0 illustrates a matrix of the functional disciplines involved in cost reduction programs and the organizational structures that use these programs. Of the functionals involved with cost reduction initiatives, the program manager has the final authority for program decisions, and the other functional managers listed either work directly for the program manager or are matrixed into the program manager's organization. The manufacturing manager is directly responsible for cost savings program execution. Other functional areas have specific roles in support of the cost savings programs. For example, pricing validates costs and savings figures for individual projects. Program control assesses the impact of cost savings programs. Contracting handles all business arrangements with the defense contractors relative to the cost savings programs. The functional managers are organized within two

general types of program management organizations. Those assigned to major system program offices (SPOs) are dedicated to one particular major weapon system while those assigned to basket SPOs work on multiple programs.

In order to gather data relative to a cost savings consolidation effort, a detailed case study was conducted into the B-2 Cost Reduction Initiative effort. It represented an in depth look at a major SPO which transitioned from the use of three separate and distinct cost reduction programs (IMIP, MANTECH, and Value Engineering) to one consolidated program. In order to assess the rationale for this change and its impact, all functional managers associated with the initiative were included in the research. This represented a vertical cut of the research model illustrated in Table 3.0.

The results of the literature review and the B-2 Case Study were then compared to the experience of other SPOs. This consisted of an assessment of the experiences of program managers and manufacturing directors in both major and basket SPOs. This horizontal slice of the research model intended to validate the problem areas identified in the literature review and the preconsolidation experience of the B-2 program as well as to determine insofar as possible whether the B-2 consolidation experience could be done in other SPOs as well.

Table 3.0 Research Design Matrix

Functional Area	Major SPOs	Basket SPOs
Program Mgt	B 2  C A S E	PROGRAM AND MANUFACTURING DIRECTOR'S STUDY
Manufacturing Mgt		
Other areas: Pricing Program control Contracting		

### B-2 Case Study

B-2 Case Study Variables. There were three primary variables to be investigated in the B-2 case study. These variables were the motivations to consolidate, the implementation concerns, and the results of the consolidation.

Under the primary heading of motivations, we identified three variables to test for to help understand these motivations. The first was the effectiveness of cost savings programs prior to consolidation. We expected the effort prior to consolidation to be ineffective. This variable was investigated through the change in projects and savings totals before and after the consolidation and a Likert scaled question for personal impressions. The second variable we tested for was the confusion of cost savings programs on the B-2 prior to consolidation. We expected

confusion. This variable was measured by the size of the documentation required and Likert scaled questions of personal impressions. The next variable was the priority of cost savings prior to consolidation. This variable was measured with Likert scaled questions also. Finally, there was an open ended question of other factors that affected motivation to consolidate to capture missed variables.

The next primary variable was implementation concerns. This variable was first investigated with the variable of the number of personnel assigned to cost savings before and after the consolidation. We expected this number to go down after the consolidation. This variable was measured by data gathered on personnel assigned to the B-2 SPO before and after the consolidation and the assessments of the managers interviewed. The second variable was the effect of the consolidation on program guidance. We expected the guidance to be reduced. This variable was measured by the count of pages of guidance before and after the consolidation and also general impressions from an open ended question.

The next variable investigated the change in individual's awareness to effect program savings. We expected the awareness to increase. This variable was measured with a Lickert scale of impressions. The final variable related to implementation concerns was the effect of cost savings consolidation on the ease of understanding

the program. We expected it to be easier to understand. This variable was measured by Likert scaled that gathered general impressions.

The final primary variable investigated the results of the consolidation. We expected the results to be positive. To measure this variable we used two opened questions to list and rank the pros and the cons of the consolidation effort. Using these variables and through a series of personal and telephone interviews with eleven B-2 personnel, a thorough case study was developed as to why the B-2 consolidated its cost savings programs and the impact this consolidation has had on the B-2 program. This effort represented an in depth look at one SPO's effort to consolidate its cost savings programs. This research was designed to use the case study method to develop a detailed, vertical review of all the conditions surrounding the B-2's unique attempt to consolidate its cost savings programs.

A case study is problem oriented and "represents an intensive study of phenomena using a variety of data sources and tools" (Lang and Heiss, 1984:85). The case study method places emphasis on the careful analysis of a finite number of events or conditions and their interrelationships. "An emphasis on detail provides valuable insight for problem solving, evaluation, and strategy" (Emory, 1980:143). This extensive study yielded insight into why the B-2

consolidated its cost savings activities and the impact this consolidation has had on the B-2 program.

B-2 Case Study Respondents. The population of respondents for the B-2 case study consisted of B-2 personnel who had experience with the B-2 consolidation program. Because of the small size of this population, the authors took a census of the entire population rather than a sample. Eleven interviews were planned and conducted although one interview was only, partially completed because the individual had only partial knowledge of the CRI program.

B-2 Case Study Questionnaire Development. A case study method was employed to gather the opinions and insights of the individuals who developed and used the B-2 consolidation. In addition to this survey, a list of objective data points was gathered to support the opinion based responses from the survey.

Both open-ended and Likert scale questions were used on the B-2 case study survey. Research methodology was referenced for appropriate Likert scales, and all questions were pretested to assure that the respondents would understand the questions asked. The complete questionnaires used in this research are located in Appendix A.

The first theme investigated the factors that led to the B-2's consolidation of cost savings programs. This section was introduced with an open ended question that represented a search for the variables and a confirmation of preselected variables. The open ended question on why the B-2 consolidated was intended to eliminate any bias that could have been introduced by specific questions concerning the preselected variables. This question was then followed by three Likert scaled questions (with one being strongly agree and five being strongly disagree) to investigate the preselected variables of (1) the effectiveness of cost savings prior to consolidation, (2) the level of confusion within cost savings programs prior to consolidation, and (3) the priority of cost savings prior to consolidation. To validate this information, hard data was gathered on the savings totals and project totals prior to and after the consolidation. This section concluded with a final open ended question to capture any insights that may have been prompted but not directly addressed by the interview questions.

The second theme investigated was the results of the consolidation. This area was introduced with an open ended question asking the effects the consolidation had on the number of personnel assigned to cost savings duties. This variable was validated with hard data gathered on the number



of personnel assigned to cost savings before and after the consolidation. The next subsection in this theme investigated the effect the consolidation had on program guidance which was introduced with an open ended question on the effects on guidance caused by consolidating. This question was placed first to avoid any bias introduced by the preselected, specific variables. Three Likert scaled questions followed this question that investigated the preselected variables, specifically the consolidation's effect on (1) pages of applicable guidance, (2) awareness of individual's ability to affect cost savings, and (3) ease of understanding. To validate the first preselected variable, the number of pages of guidance currently published outside of the B-2 was compared to the pages of guidance in the B-2 Memorandum of Agreement. This subsection on guidance was closed with a final open ended question to gather any responses that may have been prompted by the interview. The section on the results of the consolidation closed with two open ended questions on the effect the consolidation had on the number of projects generated and the savings totals produced. Again, to validate these responses, hard data was gathered on the project and savings totals before and after the consolidation.

The final theme investigated the implementation and use of the B-2's program. This section investigated the pros

and cons of the consolidation. Each respondent listed the pros and cons and then rank ordered them from most important to least.

#### Program and Manufacturing Director Surveys

A series of personal and telephone interviews with 18 program managers and 18 manufacturing directors, provided a cross sectional view of the problems faced in cost savings programs and opinions towards a consolidation.

Program and Manufacturing Director Variables. The variables for these surveys flowed from the problems with current cost savings programs identified in the literature review, and the problems experienced by the B-2 program prior to their consolidation of savings programs.

The variables used were duplicated for each of the cost savings programs investigated in the interview, IMIP, MANTECH, and VE. IMIP will be used in this discussion of variables. This section will focus on the variables as they relate to the IMIP program. The same pattern of variables was used for the other two programs as well and will not be repeated. The variables were grouped in three categories. These were general issues with IMIP, specific program issues of IMIP, and reactions to a consolidation.

The first variables under general issues were, benefits of IMIP, benefits related to cost, and problems with IMIP. There were no predicted answers. These were open ended questions to capture personal impressions. Following were two variables of interest, (1) IMIP's benefits in relation to cost, and (2) how complicated is IMIP to understand. We expected IMIP to have a good cost relationship but be difficult to understand. To measure these variables, we use Likert scaled questions to gather impressions.

The second category of variables under investigation were specific program issues. The variables in this section included implementation problems, administration problems, impact on contract, availability of technical support, contractor concerns, and contract administration office concerns. Each variable was measured by Likert scales to gather general impressions.

The final category of variables was the reaction of program and manufacturing directors to a consolidation. The variables in this category included the effectiveness of one focal point for consolidation, effect of consolidation on the program cost objectives, the effect of one focal point on cost savings, effect of consolidation on regulations, and the effectiveness of current cost savings programs. The expectation was that results would favor a consolidation. These variables were measured with Likert scales to gather

general impressions. The next variables related to the impact of a consolidation to existing contracts. This impact was related in the terms of the administration, schedule, bureaucracy, savings, implementation and understanding. Again, the expected results were acceptance of a consolidation. These variables were measured with Likert scales to gather general impressions. Seventeen total interviews were conducted.

Program and Manufacturing Director Respondents. The populations for this part of the research were Air Force program managers and Air Force manufacturing directors. Program managers were interviewed because they have overall responsibility for program execution. Manufacturing directors were interviewed because they have the function responsibility to execute cost savings programs. Because the time and cost would be excessive to interview each of the individuals in the population, a sample of convenience was chosen of the major program managers and manufacturing directors at the Air Force's Aeronautical Systems Division (ASD) at Wright Patterson AFB, OH.

Initially, a total of 36 interviews were planned. Of the seventeen respondents contacted, 2 did not have any of the major cost reduction programs on their contracts and were unable to contribute to the survey in detail. Six

Program Managers had more than one major cost reduction program on their contract; therefore, the other twelve Program Managers were not contacted. One of the 6 Program Managers could not be contacted during the interview time frame. Because of the need for personal interviews, ASC/South was not contacted for this research.

Program and Manufacturing Director Questionnaire Development. To gather these largely opinion based responses, personal interviews were developed. These interviews employed open ended questions to give respondents freedom in answering to help explore the rational and insights. Five point Likert scale questions were also used. Research methodology was referenced as to which Likert scales to use (Dillman, 1978:286). All questions were also pretested to assure respondents understood the questions asked.

The interview for the manufacturing director survey was initiated with a short introduction of the interviewer and the research. The first theme of this survey investigated the demographics of the respondents. Job title, years of acquisition experience and experience with IMIP, MANTECH, and VE were gathered to help understand the experience levels and insure the validity of the data being gathered. From this point, the survey was broken down into three identical sections for each cost savings program. For this

methodology, the IMIP section will be used as the example. The IMIP section was introduced with a question asking if IMIP was on contract or not. If not, the interviewer went on to the next cost savings program section. This question was followed with a section dealing with the theme of general issues surrounding IMIP. To avoid the introduction of any bias, three open ended questions were asked to help identify variables and validate preselected variables. These open ended questions included the benefits of IMIP, the benefits in relation to the costs, and problems encountered with IMIP. These open ended questions were followed with two specific Likert scale question that investigated the preselected variables of IMIP's relation to cost savings, and how complicated IMIP is to understand for the program and manufacturing directors. The final variable in this theme asked the respondent to rate each cost saving program employed.

This theme was followed by the section that investigated the specific program issues encountered. It included six Likert scale questions that investigated the following preselected variables. Implementation problems, administration problems, impact on contract, availability of technical support, contractor concerns and contract administration office concerns. The IMIP section closed with one final open ended question about any unvoiced

concerns with IMIP. This question was intended to capture responses stimulated by preselected variables. This pattern of questions was repeated two more times for MANTECH and VE.

The final theme that was introduced in the survey was reactions to a consolidation. This section used Likert scales to assess each respondents attitudes toward four preselected consolidation variables: (1) the effectiveness of one focal point for cost savings, (2) the effect of consolidation on program cost objectives, (3) the effect of consolidation on regulations, and (4) the effectiveness of current programs on savings. This section was followed by a section to specifically identify areas of contractual impact of a consolidation. Likert scale responses assessed the consolidation's impact on (1) cost, (2) administration, (3) schedule, (4) bureaucracy, (5) savings implementation and (6) understanding. This section was closed with open ended questions that investigated other savings programs currently in use and to also ask any other opinions on the consolidation generated by the preselected variables.

The program manager survey was a duplicate of the themes used in the manufacturing director survey, but each section was condensed to help shorten the interview duration. In order to accommodate the schedules of high ranking program managers, these interviews were limited to between ten and fifteen minutes.

### Methodology Justification

Case study was the research method employed for gathering the data from the B-2 SPO. In this situation, the body of existing knowledge was very small and undeveloped. The B-2's consolidation was unique, but their experience with consolidation represents the only experience available and could provide useful insights into the benefits and problems encountered in consolidating. Also, the idea of consolidating existing cost savings programs is still underway at the B-2 SPO. For these reasons, the case study method was chosen to explore, in depth, the conditions and results of the B-2's effort.

Initially, mail surveys were considered as the data gathering instrument for both the B-2 and program manager samples. Because of the nature of the research for the case study, there was a strong need to understand the underlying rationale of decision makers who guided the B-2 consolidation effort. The understanding of their attitudes and perceptions was critical to the research. For these reasons, the use of personal and telephone interviews was determined to provide the most useful data. The nature of the research for the program manager and manufacturing director interviews could have been performed with mail survey, but the authors judged that personnel and phone interviews would yield better data. First, personal and



telephone interview would allow the interviewer to probe for underlying attitudes, rational and understandings. Second, the sample for these interviews are all located nearby, and third, the time constraints associated with sending out and receiving mail surveys precluded their use.

The use of phone and personal surveys provided several benefits for the research conducted.

#### Phone Interviews:

The selection of telephone interviews over a mail survey has a positive effect on the quality of answers received. According to Don A. Dillman in his book Mail and Telephone Surveys,

The absence of an interviewer puts the mail questionnaire at a distinct disadvantage. Not only do some people find it more difficult to express themselves in writing than orally, but the absence of the interviewer's probes frequently results in answers that cannot be interpreted and sometimes no answer at all. The difficulty of the open-ended questions and the near impossibility of solving it represents one of the most severe shortcomings of mail questionnaires. (Dillman, 1978:58)

James H. Frey in his book Survey Research By Telephone indicates that the use of telephone surveys has come of age because of the indication of a growing resistance to mailed survey response (Frey, 1989:11).

There are several advantages to the use of telephone surveys over mail surveys. Paul J. Lavrakas in his book Telephone Survey Methods Sampling, Selection, and Supervision identifies three of these advantages. The first

is "no other approach to surveying provides this control over quality. When properly organized, interviewing done by telephone most closely approaches the level of unbiased standardization that is the goal of all good surveys." The second advantage identified by Lavrakas is its cost efficiency, and the third major advantage is the speed with which data can be gathered and processed (Lavrakas, 1987:12). There is one major limitation to the use of telephone surveys versus personal interviews or mail surveys. This limitation is the restriction on the length and complexity of the interview (Lavrakas, 1987:12). The average respondent soon grows tired of the phone interview if it lasts over 20 or 30 minutes (Lavrakas, 1987:12). For this reason, we attempted to hold the interview length for both the case study and the program manager survey were limited to no more than 30 minutes. On the B-2 case study somewhat longer interviews were more acceptable because of the previous working relationship the interviewer had with the respondents and with the willingness of the respondents to participate.

Personal Interviews. Personal interviews also represented positive benefits for this research and were a primary tool used to gather data. Emory identifies several advantages to the use of personal interviews. The personal

interview's greatest value is in the depth and detail of data that can be gathered. "Interviewers can probe with additional questions and gather supplemental information through observation." The personal interview allows control through prescreening to assure respondents are responding to the correct questions. Interviewers can use special scoring devices and visual aids. Finally, interviewers can change the language of the interview if communication problems become evident (Emory, 1980:320).

In both the case study and the program manager/manufacturing director interviews, open-ended questions were primarily used to provide the respondents freedom to explain their views and the reasons behind them. In addition, the community of knowledgeable respondents was small and the body of knowledge was undeveloped, so a large sample statistical survey was not feasible. The majority of interview questions were open-ended in nature to allow maximum freedom for the respondents to express their opinions.

Another factor influenced the decision to use phone and personal interviews. There has been no previous research in this area. Further, there is no commonly agreed upon established practices or procedures for consolidating cost reduction programs. Therefore, it would be almost impossible to construct a mail survey that could examine the

issues in significant detail yet be commonly understood by all respondents. Additionally, the small size of the population and the close location of the population to the interviewers made it convenient to simply talk to the respondents rather than use a mail survey. Because of these concerns and the time constraints imposed, the authors judged that telephone and personal interviews would provide the most complete data.

#### Interview Technique

For the B-2 case study, the interview questions were not designed to require visual aids or supports. However, the program manager and manufacturing director interviews used cue cards to identify the values associated with the various Likert scales used. The number of questions was also limited to meet the 30 minute time restriction discussed above for both the case study and the program manager/manufacturing director interviews.

It is important to quickly establish a good rapport with the respondents when initiating an interview. To encourage this atmosphere of trust and cooperation, the respondents must feel the experience will be pleasant and satisfying, they must feel the effort is worthwhile and important, and the respondent must have all mental reservations satisfied (Emory, 1980:162). In order to

ensure the above issues that were addressed in the interviews, each respondent was assured of the academic nature of the research and that this data was being gathered for a masters thesis. For the B-2 case study, the respondents were also informed that the Deputy Program Manager of the B-2 SPO was a sponsor of the research. The program managers and manufacturing directors were informed that the Director of Manufacturing and Quality Assurance for ASC was also a sponsor of the thesis. Each respondent was guaranteed that his identity would remain anonymous. This anonymity was used to help secure honest open answers from all respondents. Finally, each respondent was allowed full freedom to add any additional information to the interview they thought necessary. This was done to ensure the respondents understood their opinions were valuable to the research.

For the B-2 case study, notes were reviewed immediately following the interviews while the data was fresh in the mind of the interviewer to fill out any missed data in the survey instrument. For the program manager and manufacturing director interviews, a tape recorder was used. The recording was used to complete the survey instrument after the interview. Each respondent was informed of the intended use of the recording and that the recording would be destroyed after the review.

### Data Analysis

This study represents qualitative research. Much of the data gathered for both the case study and the program manager/manufacturing director survey was qualitative in nature and based on the subjective opinions of the respondents. Where possible, quantitative data was gathered to validate the responses to the open-ended questions. Appendix A contains the data gathering instruments for the interviews.

The open-ended questions were reviewed for consistency of answers and tabulated. Based on this consistency and tabulation, analysis was presented using anecdotal descriptions of the responses. To accomplish this goal, the respondents for the B-2 case study were asked fifteen questions about the development and implementation of their Cost Reduction Initiative (CRI) program. Program managers and manufacturing directors were then asked questions about the effectiveness of the cost savings programs they employ and their opinions toward a consolidation of these programs into one comprehensive cost savings program.

For the B-2 case study and the program/manufacturing director interviews, Likert scale questions were analyzed to determine the mean and the range for the responses. The range was selected to give an idea of the homogeneity or heterogeneity of the distribution (Emory, 1980:475). The

homogeneity was determined from the mode of the Likert scales. The range was also used to give a general impression of where the answers were gathered according to the Lickert scales employed. The combined data were reviewed to identify any trends, similarities and differences between the B-2's consolidation of cost savings programs and the other programs investigated. In addition, any similarities or differences between program managers and manufacturing managers responses were investigated by a comparison of means for the Lickert scale questions.

#### Limitations

Because this research was based on a small sample, caution must be taken in drawing statistical inferences and generalizing results outside ASC. The limitation of only investigating programs at ASC was a result of the time and money constraints involved. Because this is a predominantly qualitative assessment, reliability was gauged by a consensus of respondent answers to the interview questions. Consensus, for the purpose of this study, was defined as representing 51% or better of the answers. Interrater reliability and standardization were accomplished through strict adherence to a structured interview format. Each question was read verbatim from the interview sheet provided for the rater.

A final limitation was in the lack of historical data available on the B-2 program. Because of the nature of highly classified programs, there was little historical data on the B-2's cost reduction efforts prior to consolidation. Some reports and photos of early MANTECH projects were available, but no other firm data on early B-2 cost reduction was maintained. This fact limited the quantitative data gathered from the B-2 SPO. There was quantitative data on the B-2's cost reduction program after consolidation but not prior to consolidation.



#### IV. Findings and Analysis

##### B-2 Cost Reduction Initiative Case Study

Introduction. A total of eleven interviews were conducted during the time period from 3 June 1992 to 19 June 1992. Individuals having experience with the B-2 cost reduction initiative program representing program management, contracting, program control, manufacturing and pricing were interviewed. The interview duration for both personal and telephonic interviews ranged from 30 minutes to 60 minutes. The analysis of the 15 interview questions is provided in this section of chapter IV. The interview questions are located in Appendix A.

Factors that led to the B-2 Consolidation. What factors led the B-2 to consolidate its cost savings program. Why were these factors important?

One hundred percent of the respondents indicated that the overriding reason that the B-2 consolidated its separate cost savings programs into one coordinated effort was to take advantage of the efficiency and effectiveness of using one program rather than three. The B-2 System Program Office (SPO) recognized that the Industrial Modernization Incentive Program (IMIP), the Manufacturing Technology Program (MANTECH), and the Value Engineering Program (VE)

all had their own agendas with separate rules and procedures. The B-2 SPO had certified to Congress that specific cost savings figures would be obtained. Table 4.0 illustrates the savings figures, for three possible production totals, the B-2 SPO had certified to Congress.

Table 4.0 - B-2 Savings Certification per Aircraft

Aircraft Prod. #	Certified Saving	Potential Savings
132	\$2.2 Billion	\$2.6 Billion
75	\$2.2 Billion	\$2.2 Billion
20	\$400 Million	\$550 Million

The SPO was not interested in the bureaucracies of these separate savings programs. The B-2 needed to reduce cost quickly and efficiently to save the program. The result was to combine the separate savings programs into one program with common ground rules and assumptions.

Table 4.1 summarizes the responses for questions two through four which relate to the other factors that led the B-2 to consolidate its cost savings programs.

Table 4.1 Factors Leading to Consolidation

Description of Question	Scale*	Mean	Range
Savings programs ineffective	12345	2.1	2-3
Savings programs were confusing	12345	3.4	2-4
Savings had a high priority	12345	1	1

\*           1           2           3           4           5  
           Strongly   Mildly   No       Mildly   Strongly  
           Agree     Agree   Opinion   Disagree   Disagree

On a five point scale with one being strongly agree and five being strongly disagree, were standard cost savings programs ineffective on the B-2 program? Why?

The mean answer for this question was 2.1 with the range being 2-3. The majority of respondents felt there was little done in the way of cost savings projects prior to the consolidation, but what was initiated showed promise. It was too early in the program to expect many results. Because of the nature of highly classified programs, there was little documentation maintained on savings programs prior to the B-2's consolidation in 1988. Some IMIP projects were initiated and several MANTECH projects were completed, but the only documentation is in the form of old project briefings and photos. Strict documentation of savings programs has been maintained since the consolidation. It is difficult to say whether lack of progress on cost savings prior to consolidation was related to the early stage of the program.

On a five point scale with one being strongly agree and five being strongly disagree, were cost savings programs confusing prior to the consolidation? Why?

The mean answer for this question was 3.4 with the range being 2-4. The answers to this question centered on the premise that the guidance for each separate cost saving proposal was not confusing in itself, but when the programs were viewed in total there was confusion between which program to use for different proposal types. This supports the premis that a consolidation program would be administratively easier.

On a scale of one to five with one being strongly agree and five being strongly disagree, did cost savings have a high priority on the B-2 program? Why?

The mean answer to this question was 1 with all respondents strongly agreeing that cost savings was a high priority. Respondents identified the fact that the B-2 SPO had certified to Congress up front the savings that would occur from the new consolidated savings program. As the program progressed, the real prospect of having the entire program canceled because of cost also was a factor in driving cost savings as a high priority. Even though cost savings had a high priority, little was done because of the early phase of the B-2 development.

Can you think of any other reasons that led to the B-2's consolidation of cost savings programs?

This question was asked to allow respondents to voice their opinions on why the B-2 consolidated its cost savings programs. All respondents answered no.

Implementation Issues. How did the number of administrative personnel assigned to manage the B-2's cost savings programs change after consolidation.

Out of the ten respondents interviewed, four were not sure if there had been any reduction in the administrative personnel assigned. Six of the respondents, who had more direct insight into the number of personnel assigned, were in agreement that the reduction was from three people to one. The IMIP, MANTECH, and VE functional personnel were all rolled into one job and one individual. There was no long term historical personnel record kept to verify this reduction. There was agreement between the respondents that no one lost their job when the consolidation occurred. Individuals were assigned to other areas of the program that were in need of attention. For example, the MANTECH manager was freed up to execute special projects that had been left unattended. He was able to lead a comprehensive fuel tank sealant review project that included reviewing officials from throughout ASC. He was also able to take on the duties of being the assistant division chief for the unit.

This supports the conclusion that a consolidated program would take less personnel to administer.

Did the B-2 cost savings consolidation result in better program guidance? In what way?

The answer to this interview question was a unanimous yes. The consensus for why this occurred was the efficiency gained when the SPO abandoned the three separate programs with their separate procedures and adopted one program with one set of ground rules to capture any possible project that would yield program savings. It was also identified that the consolidation resulted in better program guidance through the maintenance of one focal point for savings at both the SPO and the prime contractor. This allowed just two individuals to communicate between the Government and contractor rather than six. This indicates that guidance for cost savings would be improved in a consolidated environment.

Table 4.2 summarizes the responses to questions eight through ten which relate to whether the consolidation of the B-2 cost savings programs resulted in better program guidance.

**Table 4.2 Factors of Guidance After Consolidation**

Description of Questions	Scale*	Mean	Range
Pages of guidance was reduced	12345	1.5	1-2
Individual awareness increased	12345	1.6	1-2
Ease of understanding enhanced	12345	1.5	1-2

\*           1               2               3               4               5  
           Strongly   Mildly       No       Mildly   Strongly  
           Agree     Agree     Opinion   Disagree   Disagree

On a scale of one to five with one being strongly agree and five being strongly disagree, were the number of pages of guidance reduced after consolidation? Why?

The average response for this question was a 1.5 with the range being 1-2. Again there was a consensus from the respondents that the size of the guidance was reduced because the separate guidance for IMIP, MANTECH, and VE was condensed into one common package of guidance for the B-2's Cost Reduction Initiative (CRI) Program. None of the respondents had direct knowledge of exactly how much the guidance was reduced, but they each felt that the new guidance was streamlined and represented a more concise and simplified version of guidance than was present before the consolidation.

The current combined guidance for IMIP, MANTECH, and VE programs totals 240 pages. The B-2 CRI Memorandum of Agreement (MOA), which is the primary guidance for the consolidated savings program, is 15 pages long. This data

suggests that guidance for a consolidated program would be drastically reduced.

On a scale of one to five with one being strongly agree and five being strongly disagree, was the awareness of individual's ability to effect cost reduction increased after consolidation? Why?

The average response for this question was 1.6 with the range being 1-2. All respondents were in agreement that the consolidation of cost savings programs on the B-2 program heightened the awareness of each individual's ability to effect cost reduction. There were several reasons identified for why this occurred. The most common response was the consolidation created a banner program for cost reduction which heightened attention to cost savings at all levels. This single program created focal points or "champions" within the government and contractor. The consolidated program also carried with it increased publicity. The next reason identified by the respondents was the unique capability of the Cost Reduction Initiative Program to allow the consideration of any proposal that had the potential to reduce costs. Individuals did not have to understand the different requirements for IMIP, MANTECH, or VE proposals. All they had to understand was that their idea had the potential to reduce cost in order to be considered. In the same vein, respondents saw the reduction from three separate programs down to one as also enhancing



awareness to effect cost savings simply because it was easier to advertise and understand one program rather than three. This data indicates that general awareness can be enhanced through a consolidated cost savings effort.

On a scale of one to five with one being strongly agree and five being strongly disagree, was ease of understanding the program enhanced through consolidation? Why?

The average answer for this question was 1.5 with the range being 1 to 2. All responses centered around the idea that one program with common ground rules and procedures is easier to understand than three separate programs with separate rules and procedures. All respondents agreed that understanding was enhanced at all levels from direct labor to management. This indicates that a consolidated program would be easier to understand.

Can you think of any other ways the consolidation affected program guidance?

This question was asked to provide the respondents the opportunity to voice any other opinions on the effect the B-2's savings consolidation had on program guidance. All responses were negative for this question.

Results of the Consolidation. Did the B-2 consolidation of cost savings programs generate greater numbers of projects submitted for consideration? Why? How do you know this?

There was consensus among all respondents that the B-2's consolidation of cost savings programs generated a greater number of projects submitted for consideration. Several reasons were identified for why this occurred. The most common reason cited, with 50% of the respondents concurring, was the ability of the B-2 Cost Reduction Initiative Program to capture the savings from any suggestion that would yield program savings. Suggestions did not have to fit IMIP, MANTECH, or VE guidelines to be accepted as a viable project. It only had to save money. In addition to this reason, the increased publicity of the program was also given as a reason greater number of projects were generated. The program had a high-level champion at both the SPO and the contractor that ensured visibility of the program at all levels. The consolidation also resulted in simpler procedures that resulted in shorter processing times allowing more projects to be reviewed. A final reason given for why the consolidation generated greater numbers of projects for consideration, is the CRI program broke down barriers that exist between the separate cost savings programs and allowed all participants to work towards the common goal of reducing cost on the B-2 program.

In response to the question of how do you know that the numbers of projects was increased, the response was that the answers were opinion in nature. Without keeping two sets of books, one for the old process and one for the new, there would be no way to know for sure. The B-2 SPO did not document the number of savings projects generated prior to the consolidation, so there was no way to compare the project generation levels before and after the consolidation. Even though it would require a double book environment to answer this question conclusively, the opinions of the experts interviewed clearly indicated that a consolidated program would result in greater numbers of projects submitted.

Did the B-2 consolidation of cost savings programs increase savings beyond what the separate individual programs would have produced in total? Why?

Although there was the concern that without running both systems side by side you could never know for sure, there was consensus among all respondents that the consolidation did increase savings beyond what the separate individual programs would have produced in total. The primary reason cited for this belief was the ability of the CRI program to capture savings from any project. This kept the proposals from having to be classified as IMIP, MANTECH, or VE to get consideration. Seventy percent of the

respondents felt this was the primary reason. Other responses that supported the statement that savings was increased were that it is cheaper to administer one savings program rather than three separate programs, and because the program was easier to understand than three separate programs, it was used more often to produce greater savings.

The B-2 did not document savings program data prior to the consolidation of cost savings programs, so there is no way to compare the savings figure before and after the consolidation. To answer this question accurately, two sets of books would be needed to be kept to track the old and new system. In the absence of a two book system, the opinions of the experts indicated that a consolidated program would help result in greater overall savings.

List the five most important benefits the B-2 cost reduction program consolidation produced in order of importance. Why were each of these items important?

None of the respondents were able to generate five benefits. The average was 2.5. Of the responses gathered, 50% identified the number one benefit of the B-2 consolidation of cost savings programs as being the simplification of procedures. No longer did cost savings projects have to fall within the separate processes of IMIP, MANTECH, or VE. Projects only had to qualify within the single set of rules for the B-2 Cost Reduction Initiative

Program. Thirty percent identified the number one benefit as being the ability of the new program to broaden the scope of acceptable projects by allowing consideration of any project that represented savings for the B-2 program. The final 20% identified the creation of a central focal point of responsibility for cost savings at both the SPO and the contractor. This focal point provided the champion necessary to drive the program. It also enhanced communication between the government and contractor by having one individual responsible for cost savings for the government and contractor. Another benefit that was identified was the consolidation provided better motivation for the prime and subcontractors because the expanded scope of acceptable projects allowed them the possibility to participate in a greater pool of savings. Also, the consolidation made everyone involved aware of the importance of cost savings and each individual's ability to participate in helping to generate savings. A final benefit that was identified was the positive publicity that the consolidation brought to the B-2 SPO. The CRI program was an indication of the SPO's attempt to use Total Quality principles to enhanced current situations. It was also good publicity because it illustrated to Congress that the B-2 SPO was taking a strong, proactive approach to controlling cost growth on the program. This data indicates that there are

clear benefits that result from a consolidation of cost savings programs.

List the five most significant problems the B-2 cost reduction program consolidation produced in order of importance.  
Why did each one represent a problem?

Again, none of the respondents were able to generate five significant problems encountered with the consolidation of the cost savings programs on the B-2 program. Of the responses gathered, 50% identified the short term growing pains as the most significant problem with the consolidation. Respondents cited the difficulty with developing the new procedures, both internally and with the contractor, to efficiently and effectively administer the new program. There was no history to guide the development. These growing pains were seen as being inevitable with the introduction of any new system. Thirty percent of the respondents identified the most significant problem with the consolidation was the resistance of the established empires of IMIP, MANTECH, and VE to give up the control over their program and endorse the new cost savings system developed. This resistance created short term problems with communication and cooperation between all individuals concerned. The final two concerns that were rated as the number one significant problems by respondents were the facts that the savings goals were certified by the SPO to

Congress and the program instability deterred savings. The concern with the certification to Congress was that this certification resulted in a corresponding budget reduction for the program. The SPO then had to generate the savings predicted to stay on budget. The issue surrounding program stability was the effect each program reduction had on the CRI program. Initially, all proposals were figured on a production run of 120 aircraft, followed by 70, and finally 20. Each reduction eliminated many proposals that represented strong savings at the original production run. This elimination reduced morale and the motivation to continue to put the effort into new ideas for savings. Another significant problem identified by the respondents was the fact that the CRI program was unique to the B-2. This caused communication problems with other concerned organizations on exactly what the B-2 was doing. This required a recurring effort to educate outsiders of the B-2's new program. A final problem identified by the respondents was the initial lack of contractor commitment to maintain the necessary personnel to administer the program as a problem. Without the proper contractor commitment any program would face difficulty. This data indicates that care must be taken to help avoid the problems inherent in the consolidation of cost savings programs.

B-2 Summary. In conclusion, the B-2 was faced with an urgent need to reduce costs to save the program. The vehicle developed to achieve the needed cost savings was the B-2 Cost Reduction Initiative Program. This program represented the consolidation of IMIP, MANTECH, and VE into one streamlined program directed at reducing program costs.

The B-2 executed this consolidation to take advantage of the efficiencies of operating one savings program rather than three separate activities with separate rules and processes. The need to reduce program cost was great. The B-2 SPO had certified savings totals to Congress and had to meet these goals. Congress had reduced the B-2 budget commensurate with the savings goals. This new consolidation allowed the B-2 program to take advantage of any savings opportunity and not just those projects that fit into IMIP, MANTECH, and VE. The consolidation also eliminated the confusion as to where a project would fit in the cost savings environment.

There was no clear indication of how effective the savings vehicles were on the B-2 program prior to consolidation. It was too early in the program to have expected many results. Also, because of the nature of highly classified programs, there was little documentation maintained on cost savings efforts prior to 1988.

Although no jobs were eliminated, the number of



personnel to administer the cost savings programs dropped from three to one. The individuals who were freed from their cost savings duties were applied to other areas of the program needing attention.

The consolidation appears to have resulted in better program guidance. The SPO no longer needed to manage three separate programs, but only one. The number of pages of cost savings guidance dropped from 240 to 15. Individuals were made more aware of their ability to effect cost savings and had a better understanding of the program because of the consolidation. This was a result of having one program rather than three which received high level visibility and support.

This consolidation also helped to increase the total number of projects submitted for consideration. Again, the high level visibility and support enhanced publicity of the program. Also, the consolidation had the ability to capture any savings opportunity, not just IMIP, MANTECH, and VE. These two reasons were also the foundation of the belief that the B-2's consolidation increased savings beyond what could have been obtained with three separate programs.

The top three benefits of the consolidation in order of importance were first, the overall simplification of procedures. No longer did the SPO or the contractor have to wrestle with three separate and competing savings programs.

The second benefit was the ability of this new program to capture the savings from any opportunity, not just IMIP, MANTECH, and VE. Finally, the consolidation provide one high level focal point for cost savings at both the SPO and contractor. This focal point helped to greatly enhance the visibility and publicity of the program.

In contrast, there were several problems identified with the consolidation. Initially, the growing pains of instituting a new program presented some problems, but these were perceived as being inevitable with the implementation of any new effort. The second problem identified with the consolidation was the fact that the separate empires of IMIP, MANTECH, and VE were dissolved by the consolidation. There was resistance by each of these organizations to give up their control. A final problem identified, was that savings goals had to be certified to Congress. The B-2 SPO had to make these goals because once this certification was made, the budget for the B-2 program was reduced by these savings predictions.

## Manufacturing and Program Directors Surveys

Introduction. During the period of 6 July 1992 to 22 July 1992, an attempt was made to contact every Manufacturing Director within ASC for a personal interview. There was a total of 18 program offices at ASC of which 14 were at Wright-Patterson AFB. The additional 4 SPO's were located at ASC/South; Eglin AFB, Florida. Programs at ASC/South were not contacted because of the personal interview requirements and time constraints. Of the 18 offices at Wright-Patterson, ten surveys were answered in detail by the various Manufacturing Directors. Two programs that were assessed did not have any of the three cost reduction programs in place and thus did not have significant input into the major cost reduction issues. Two other programs were not used in the survey because they could not be contacted within the designated time frame.

The interview duration for the Manufacturing Directors ranged from 25 to 30 minutes, depending on the depth of discussion and the quantity of cost reduction programs that were on contract. The interviewees were given an opportunity to elaborate on each of the statements and questions listed in the survey. Manufacturing Directors were asked to give their opinions on many issues relative to manufacturing cost reduction programs and the feasibility of

consolidation of these programs. They were also allowed to relate personal experiences they have had with any manufacturing cost reduction programs.

Once the Manufacturing surveys were performed, a shortened survey of 15 minutes was conducted on the Program Directors or their representatives. This abbreviated survey was used to get the perception of Program Directors relative to manufacturing cost reduction. It was not as extensive as the Manufacturing survey, however; the questions that were asked came directly from the longer version. The surveys for both the Manufacturing and Program Directors can be seen in Appendix A.

Because this research concentrates on the feasibility of consolidating more than one of these cost reduction initiatives, only SPOs with two or more initiatives were considered for Program Director interviews. Many of the programs at ASC did not use a combination of major cost reduction programs. As a result, only 5 Program Directors were considered for interviews. There was an additional SPO that met this condition, however they could not be contacted during the period of review.

The following sections examine the various topics of the survey conducted on Manufacturing and Program Directors. The section starts by reviewing the experience levels of the Directors interviewed, then looks at the programs that use

the three major cost reduction initiatives. Next, the review goes on to look at each individual cost reduction program that was assessed in this research.

Experience. In the first section of the survey, the respondents were asked to provide data relative to their program and manufacturing cost reduction experience. Each respondent was also asked how many years they have dealt with IMIP, MANTECH, and VE. Table 4.3 shows the breakout of experience. The averages for the manufacturing cost reduction program were not based on every respondent interviewed. Only Directors that used major manufacturing cost reduction programs were included in the years of experience identified in Table 4.3.

Table 4.3 - Years Experience Among Survey Respondents

Experience	Avg.Tot	Prg.	Mfg.	Tot
Program	18.0	20.6	16.5	252
IMIP	7.4	5.8	8.2	179
MANTECH	10.9	13.0	9.9	102
VE	5.4	6.3	5.0	70

Table 4.3 shows that Program Directors and Manufacturing Directors both had considerable experience in

cost reduction programs for manufacturing. This was particularly true with IMIP and MANTECH. There was less experience in the Value Engineering areas for both populations that were interviewed. In fact, there was only 70 years of total VE experience among the respondents. This is due primarily because VE is often associated with the engineering field. It also illustrates the small emphasis that is put on Value Engineering among the Directors relative to other cost reduction initiatives.

As expected, the years of total program experience was very high. There were over 252 years of program experience among the fifteen interviews that were conducted. The average program experience from the respondents was 18 years. This indicates that the population that was interviewed was well informed in the areas of major acquisitions programs and manufacturing cost reduction.

Usage. All personnel interviewed were asked for information relative to their current program. Thus, they were asked which of the three manufacturing initiatives were used on their program. Then, data was gathered for only those initiatives that were applicable.

Table 4.4 - Programs on Contract at ASC

PROGRAMS	MAJ SPO USED	BKT SPO USED	MAJ SPO NONE	BKT SPO NONE
IMIP	4	2	3	3
MANTECH	4	2	2	4
VE	5	3	2	2

Six of the twelve SPOs had IMIP on a current contract. Five SPOs had MANTECH and eight of the twelve SPOs had VE on contract. As shown in Table 4.4, the most used program among the three major manufacturing programs was VE.

Table 4.4 shows 4 of the Major SPOs and 2 of the Basket SPOs used IMIP on their current contracts. Since Basket SPOs had more than one contract within their organization, they were asked to concentrate their assessment of cost reduction issues on the contract that used IMIP incentives. One of the Major SPOs that did not have IMIP on contract was in the conceptual phase of the program; therefore, they were not ready to consider whether IMIP was feasible for their contract. The other major program that did not use IMIP was using other costing methods to incentivize the contractor to implement capital improvements. The Basket SPOs that did not use IMIP were primarily using Fixed Price type contracts, which does not allow the use of IMIP.

As Table 4.4 shows, half the SPOs surveyed were using MANTECH on their contracts. Most of the programs that were

not using MANTECH on their contract were in the latter phases of production and did not have a need for new technology. Other programs did not use MANTECH because of the type of contract that was being used to purchase the acquisition.

Out of the twelve Manufacturing Directors that were asked to respond to this survey, eight had VE on the current contract. One Director interviewed did not have VE as a contractual requirement; however, stated that the contractor had implemented their own VE program in-house. Once again, the phase of the program and the type of contract were reasons why programs were not using VE.

#### IMIP.

Benefits. All respondents (Table 4.5) indicated that IMIP has benefitted ASC contracts by increasing savings and/or decreasing cost. This was identified through an open-ended question within the IMIP survey.

The respondents pointed out that there had been significant improvements made in capital investments by DoD contractors as a result of IMIP. Improvements included the implementation of state-of-the-art manufacturing techniques and solving production bottlenecks. These improvements resulted in a consistent hardware quality product for the



Air Force. A few of the Manufacturing Directors stated that IMIP was instrumental in establishing more capital improvements on the manufacturing floor and strengthening the industrial base across the country.

Table 4.5 - Manufacturing Directors Responses to Benefits and Problems of IMIP

IMIP	YES	NO
BENEFITS	6	-
PROBLEMS	3	3

When asked as to whether the benefits from the IMIP were worth the cost incurred, all respondents gave positive responses. Many times the response was that the Air Force was saving money. The IMIP also gave the contractor a mechanism to invest in capital equipment that is needed in many of the major DoD contractor facilities. Some of the Manufacturing Directors felt that the savings on the contract were proportional to the quantity of units purchased on the contract along with future Air Force contracts that would be acquired by the IMIP recipient.

Problems. While all respondents agreed that there were many benefits to IMIP, 50% stated that there are problems with the IMIP program. Many of the problems that were identified through an open-ended question, validated

the literature search and review in Chapter II. These included problems such as; difficult requirements, implementation and administration problems, difficult estimating procedures, and others. However, one significant problem came out of the Manufacturing Directors interview section. The problem was funding. All three respondents that identified problem areas, stated that funding was the biggest problem for their program. The respondents stated that there was a difficult problem in getting the funding necessary to have a successful program. There were also a variety of other problems given that were identified in the literature search. For example, in a couple of cases the Directors felt that the program was too cumbersome and paperwork intensive, thus losing some of its effectiveness to generate maximum cost savings.

Savings. The purpose of the IMIP is described in the literature review as a way to generate cost savings through capital improvement. Therefore, Manufacturing Directors were asked to rate the cost savings that have been realized through the IMIP initiative.

Table 4.6 - Manufacturing Directors Rating Savings and Understanding

RATING IMIP	1	2	3	4	5	MEAN
RATING COST SAVINGS*	-	-	1	2	1	4.00
	1	2	3	4	5	MEAN
RATING UNDERSTANDING**	-	4	-	2	-	2.67

\*           1                   2                   3                   4                   5  
           Cost Greatly   Cost   No Savings   Moderate   Significant  
           Exceed       Exceed       Savings       Savings       Savings  
           Savings       Savings

\*\*           1                   2                   3                   4                   5  
           Impossible   Somewhat   No       Easier Than   Extremely  
                          Difficult   Difference   Others       Easy

Of the 6 Manufacturing Directors that were able to rate IMIP, 2 were not privy to the information or had contracts that were too early in the program to give an accurate response. On the average, the other 4 felt that there were moderate savings. However, one felt there were significant savings and one felt that there were no savings realized. The one respondent that felt there were no savings clarified his answer by stating that the contract did not produce as many end items as originally intended. Had the contract been able to finish to completion, then the program would have realized significant savings. Every Program Director that was interviewed also felt that there were moderate savings from the IMIP program. The overall consensus is that IMIP is a viable program for decreasing the cost of

major acquisitions and increasing savings for programs within ASC.

Table 4.7 - Program Directors Responses to Savings and Understanding

RATING IMIP	1	2	3	4	5	MEAN
RATING COST SAVINGS*	-	-	-	3	-	4.00
	1	2	3	4	5	MEAN
RATING UNDERSTANDING**	-	3	-	-	-	3.00

\*           1                   2                   3                   4                   5  
           Cost Greatly   Cost   No Savings   Moderate   Significant  
           Exceed       Exceed       Savings       Savings       Savings  
           Savings       Savings

\*\*           1                   2                   3                   4                   5  
           Impossible   Somewhat   No       Easier Than   Extremely  
                          Difficult   Difference   Others       Easy

Understanding. Because the literature search showed that the regulations and requirements are often difficult to comply with, the Directors were asked to assess the difficulty of IMIP, relative to understanding the rules and regulations. Table 4.6 and 4.7 shows that there is, in fact, some difficulty with complying to the IMIP requirements. Seven of the 9 respondents stated that the IMIP requirements are somewhat difficult to understand. Two Manufacturing Directors felt that it was easier to understand than other government regulations. Three of the respondents felt that it was especially difficult for the

contractor to adhere to the process requirements. Others felt that there was little guidance in how to make the IMIP program effective. Still others felt that there is a misunderstanding of the intent of IMIP and that it should be understood that IMIP is a mutually beneficial program for both the government and the DoD contractor. Many Directors stated that the IMIP requirements are too detailed and require an estimate of cost savings justification that is overemphasized. Some of the areas within IMIP that are difficult for the parties to comprehend include the Business Agreement, the Discounted Cash Flow and the Productivity Savings Reward. Each of these elements of IMIP are defined in the Literature Search and Review.

#### Implementation and Administration Problems.

Some of the significant problems that were brought out in the Literature Search and Review were analyzed using a five point Likert scale in the Manufacturing and Program Directors interviews. Variables that focused on some of the problem areas of a manufacturing cost reduction program included: implementation problems, administration problems, contractual impact, and personnel competence. The interviews also studied the concerns that the SPO personnel received from the contractor and the resident contract administration office. Table 4.8 shows the results of the



**Table 4.9 Program Directors Response to Literature Concerns**

SUBJECT AREAS FOR IMIP*	1	2	3	4	5	MEAN
NO PROBLEMS IMPLEMENTING	1	3	1	1	-	2.33
NO PROBLEMS ADMINISTERING	1	2	3	-	-	2.33
LITTLE IMPACT ON CONTRACT	1	4	-	1	-	2.17
TECHNICAL PERSONNEL COMPETENCE	-	2	-	3	1	3.50
RECEIVED FEW CONCERNS FROM CONTRACTOR	2	2	1	1	-	2.17
RECEIVED FEW CONCERNS FROM CAS	-	1	1	4	-	3.50

\* 1 Strongly Disagree      2 Disagree      3 No Opinion      4 Agree      5 Strongly Agree

When asked about any administrative problems that may have been realized on their IMIP program, 3 of the 6 Manufacturing Directors stated that they had problems administering the IMIP program. One issue that was identified, was the burden of undating the estimating method. The other 3 had no opinion. They have also stated that they have dealt with implementation and administration concerns from the DoD contracting community.

Directors also stated that there are issues that arise in the subcontracting arena as well. In one case, it was stated that IMIP is an important tool for helping subcontractors make capital improvements. However, it is difficult for the subs to initiate a IMIP program.

Impact. There were differing opinions from the different Director communities when identifying the impact IMIP has on major acquisition contracts. Although it was not a lot of difference, the Program Directors felt that IMIP had little impact on their contract. Manufacturing Directors responses differed. Five out of 6 Manufacturing Directors stated that IMIP does have an impact on their contracts. One Manufacturing Director identified IMIP as a significant contributor to their contract. Another Manufacturing Director agreed with the Program Directors and stated that there was little impact on his contract. However, he also stated the reason there is little impact is because of the size of the program and the quantity of end items that are being purchased by the Air Force.

Technical Competence. The average respondent felt that they could go to their technical personnel for help. Only 3 out of the ten respondents stated that there were situations where they could not go to their technical personnel for help. While much of the technical support was within the manufacturing division, the Manufacturing Directors stated that their people, as well as other personnel who support IMIP, were quite competent to do the job.



Concerns. Within the framework of contractor concerns, there is once again differing opinions. Table 4.8 shows that 4 out of 6 Manufacturing Directors receive concerns or complaints from the contractor community. On the other hand, 3 out of the 4 Program Directors stated that there are few or no concerns voiced by defense contractors. The concerns issued by the contractors to the Manufacturing Directors generally deal with the implementation and administration of the IMIP program. Issues involved in contractor concerns deal with MEPs, estimating techniques and requirements, and paperwork. One Director stated that there are many issues dealing with subcontractors and the flowdown of IMIP.

One the other hand, there seems to be few concerns that come out of the contract administration office. Eight out of 10 respondents stated that there are few concerns if any that come from the contract administration personnel. Many of the respondents stated that there is very little or no input from the government agents at the plant offices.

Most of the Manufacturing Directors reiterated the need for funding to make the program a success. Some of them also felt that better management and fewer requirements would enable the IMIP to be even more successful than it is now. They all believed that IMIP, used correctly, is a necessary program that helps make the manufacturing process

easier and makes it easier for major DoD contracts to make capital investments in their manufacturing facility. It was also stated that subcontractors should be more involved in the IMIP process. The bottom line of the IMIP interviews was that the IMIP works, however, the rule should be easier and more flexible for both the government and the contractor.

Conclusion. This section of the research has shown that Program and Manufacturing Directors have considerable experience dealing with cost reduction programs for manufacturing. All respondents did agree that IMIP has provided benefits, but there was a split over the presence of problems with the program. Availability of funding was the number one concern identified. There was a consensus that IMIP represented moderate savings, and a clear majority felt the IMIP was a difficult program to understand. This point was illustrated by 4 out of 6 respondents who felt IMIP was difficult to implement, and 3 out of 6 who felt the program was difficult to administer. There was also a split between Manufacturing and Program Directors when asked to give their perception of the IMIP impact on their contracts. The Manufacturing Directors perceived a clear impact and the Program Directors did not. All respondents felt that the personnel available to administer IMIP were technically

competent. There was also a difference of opinion towards the presence of concerns from the contractor. Manufacturing Directors identified the fact that they receive concerns from the contractor and Program Directors did not. Contract administration offices appear to provide very little input into the IMIP process.

When asked to add any additional observations that may not have been discussed in the interview, some of the Directors had interesting comments. A couple of Directors stated that better management and fewer requirements would enable IMIP to be even more successful than it is now. They believed that IMIP, used correctly, is a necessary program that helps make the manufacturing process easier. It also makes it easier for major DoD contracts to initiate capital investments in their manufacturing facility. It was also stated that subcontractors should be more involved in the IMIP process. The bottom line of the IMIP interviews was that IMIP works; however, the rules should be easier and more flexible for both the government and the contractor.

MANTECH. There were 5 program offices that used MANTECH. One of the 5 is a basket SPO and the other 4 are major SPOs. While MANTECH can be used throughout the life cycle of a product, its primary emphasis at ASC seemed to be in the infancy stages of the acquisition cycle. This is based on the responses given about MANTECH through the Manufacturing Director's survey.

Benefits. As Table 4.10 shows, MANTECH, like IMIP, was rated as being beneficial to every program that had used it on their contract. All of the five Manufacturing Directors pointed out that the technology advancement was the overwhelming benefit to the MANTECH program. MANTECH has allowed Air Force contracts to insert state-of-the-art technology into the production of new weapon system. A couple of the Directors felt that MANTECH helped lower risk to both the contractor and the government. By lowering the risk, government acquisition personnel were also able to lower the overall cost of the contract. IMIP was also able to benefit from MANTECH programs by inserting the MANTECH projects into the IMIP contract.

Table 4.10 - Manufacturing Directors Responses to Benefits and Problems of MANTECH

MANTECH	YES	NO
BENEFITS	5	-
PROBLEMS	2	1

All respondents felt that the benefits from MANTECH were worth the cost incurred. MANTECH gave the contractor a mechanism to invest in new technology and state-of-the-art processing. One respondent added that the MANTECH program has enable his program to take quantum leaps in terms of advanced technology requirements.

Problems. Only 2 of the 3 Manufacturing Directors that responded to this area, stated that they have encountered problems as a result of MANTECH. These problems were identified as administrative problems during implementation, equipment purchase, and funding.

Savings. Of the five Manufacturing Directors that had MANTECH on contract (Table 4.11), only two would rate the MANTECH cost savings question. One Director identified MANTECH as having moderate savings and the other stated that there were no saving involved with the MANTECH program. All Manufacturing Directors felt that the emphasis in the MANTECH program was on state-of-the-art manufacturing

technology rather than cost savings. Table 4.12 shows that both Program Directors identified MANTECH as having moderate savings associated with the program. While they all agreed that the program was a viable cost savings tool, they felt that it was hard to quantify savings resulting from MANTECH.

Table 4.11 - Manufacturing Directors Response to Savings and Understanding

RATING MANTECH	1	2	3	4	5	MEAN
RATING COST SAVINGS*	-	-	1	-	1	4.00
	1	2	3	4	5	MEAN
RATING UNDERSTANDING**	-	2	2	1	-	2.24

\*                   1                   2                   3                   4                   5  
                   Cost Greatly   Cost   No Savings   Moderate   Significant  
                   Exceed       Exceed                   Savings       Savings  
                   Savings       Savings

\*\*                   1                   2                   3                   4                   5  
                   Impossible   Somewhat   No       Easier Than   Extremely  
                                   Difficult   Difference   Others       Easy

Understanding. Overall, the requirements of MANTECH seem to be difficult to understand. Two of the Manufacturing Directors agreed with the Program Directors. Two other Manufacturing Directors stated that there was not any difference and one stated that the requirements are easier than most. Table 4.12 shows that one Program Directors interviewed stated that the requirements and rules were somewhat difficult to understand.

One problem that was surfaced from the interviews is

that it is hard to track down the many MANTECH programs that have been funded by the various federal agencies.

Therefore, it is likely that some MANTECH funds may be used for similar efforts. There was also a concern that SPO personnel are not familiar with what the lab people do and vice versa. Also, feedback into MANTECH programs is not as good as it could be.

Table 4.12 - Program Directors Response to Savings and Understanding

RATING MANTECH	1	2	3	4	5	MEAN
RATING COST SAVINGS*	-	-	-	2	-	4.00
	1	2	3	4	5	MEAN
RATING UNDERSTANDING**	-	1	1	-	-	2.50

\*           1                   2                   3                   4                   5  
           Cost Greatly   Cost   No Savings   Moderate   Significant  
           Exceed       Exceed   Savings       Savings       Savings  
           Savings       Savings

\*\*           1                   2                   3                   4                   5  
           Impossible   Somewhat   No       Easier Than   Extremely  
                          Difficult   Difference   Others       Easy

#### Implementation and Administration Problems.

Three of the five respondents stated that they have experienced problems getting the MANTECH implemented. However, most Manufacturing Directors felt that they did not have much visibility into the program once it was underway. Table 4.13 shows the responses from the Manufacturing Directors, relating to the Literature Review issues.





Impact. Neither Program Director stated that MANTECH had an impact on their contract. One Program Director stated that the MANTECH philosophy has no impact on his contract. The other Program Director gave no opinion. Overall, the three of the five Manufacturing Directors felt that MANTECH had an impact on their contract. One Manufacturing Director stated that the positive impact that is received from MANTECH programs come from previous contracts and not the current contracts that are being awarded. Table 4.13 and 4.14 show the responses for the two Director groups that were surveyed.

Technical Competence. As can be seen in Table 4.13 and 4.14, both the Program and Manufacturing Directors stated that they could go to their technical personnel for help. In this case the Manufacturing Directors would refer to the lab personnel, as well as their own personnel, as the technical people.

Concerns. The average Director felt that there were concerns issued by the contractor concerning MANTECH. Five out of the eight Directors surveyed stated that they have had concerns issued by the DoD contractor. Two other Directors gave no opinion and only one Director stated that there were not any problems issued by the contractor

concerning MANTECH.

Table 4.13 and 4.14 shows that 5 out of 8 Directors had received concerns from the contract administration office. Their feeling was that the contract administration office has very little or no input into the MANTECH process.

Conclusion. The consensus among the Manufacturing and Program Directors is that MANTECH is an effective tool for initiating emerging technology. While most Directors felt that the purpose of MANTECH is not for cost savings on current contracts, they do agree that it is an effective cost savings program for future weapons acquisitions.

It is apparent that the MANTECH program has its share of problems. Three out of the five Manufacturing Directors identified problems in the implementation stages of their particular program. However, it was also noted that the personnel responsible for technical expert opinion are highly regarded by the Director population.

When Manufacturing Directors were given an opportunity for additional inputs relating to MANTECH, they commented that there was a need for a closer dialogue between the Program Office and the Labs. It was also reiterated that funding is necessary to insure success in MANTECH. MANTECH was thought to be an important part of technology advancement and was a necessary program that emphasized, to

the contractor, the need for new ideas and innovations. It is a "must have" program.

Value Engineering. Eight of the twelve programs that were reviewed had some sort of Value Engineering program in place. VE is used primarily on mature contracts where improvements can assist in improving the overall value of the product.

Benefits. VE did not fair as well as the other two major programs when it came to assessing the benefits from the program. Out of the 8 respondents, only 4 would state that benefits are realized from the VE program. Some of the benefits that were identified in the open-ended question were lower labor cost, less redesign, less damage, and reduced rework. A couple of Directors explained that VE is a useful tool for reducing the Life Cycle Cost of a major weapon system. Some Directors had not seen any benefit on their program and had not approved a Value Engineering Change Proposal (VECP). Table 4.15 shows the results of the VE benefits and problems section of the survey. Once again, the phase of the program and the type of contract were reasons why programs were not using VE.

Table 4.15 - Manufacturing Directors Responses to Benefits and Problems

VE	YES	NO
BENEFITS	4	2
PROBLEMS	4	2

While every Manufacturing Director surveyed, except one, stated that the VE program had no immediate or past benefit to their contracts, they do see benefits from the program if organized correctly. Many stated that they were too early into the program to institute a VE program. Others simply stated that they had not seen any benefits from the VE program.

One Director interviewed did not have VE as a contractual requirement; however, stated that the contractor had implemented their own VE program in-house. The contractor-operated VE program realized many benefits through lower labor hours, less damage and redesign, and reduce rework. However, it should be noted at this time that this contract was a Firm Fixed Price (FFP) type contract and the contractor was not required to share any savings with the government on the immediate contract.

Three respondents felt that the benefits from VE were worth the cost incurred. The respondent dealing with the FFP contract, stated that the contractor incurred any

necessary cost. Some Directors did not feel that there was a significant cost to the VE program, therefore, did not respond. Other respondents stated that they are too early into their contract, but expect to see some benefits once the production phase of the contract is on-line.

Problems. Table 4.15 shows that 4 Manufacturing Directors encountered problems as a result of VE. For example, often the contractor would misinterpret VE requirements, ideas initiated by the government would become contractor VECPS, and lack of documentation on the part of the contractor would cause confusion within the VECP approval process. Often the incentives issues between the government and the contractor were cause for conflict between the two parties. Timeliness of approving VECPS and the decision to issue a VECP or a ECP were also problems that would surface through the VE process. The other five Directors did not have any problems as a result of VE, because of the lack of use of the program or the stage of the contract itself.

Savings. Table 4.16 shows the responses given when asked to Manufacturing Directors about cost savings and requirements understanding of the VE program. Table 4.17 shows similar responses from the Program Directors.

Table 4.16 - Manufacturing Directors Responses to Savings and Understanding

RATING VE	1	2	3	4	5	MEAN
RATING COST SAVINGS*	-	-	1	2	2	4.20
	1	2	3	4	5	MEAN
RATING UNDERSTANDING**	-	3	-	3	1	3.29

Table 4.17 - Program Director Responses to Savings and Understanding

RATING VE	1	2	3	4	5	MEAN
RATING COST SAVINGS*	-	1	-	3	-	3.50
	1	2	3	4	5	MEAN
RATING UNDERSTANDING**	-	1	1	2	-	3.25

\*           1                   2                   3                   4                   5  
           Cost Greatly   Cost   No Savings   Moderate   Significant  
           Exceed       Exceed       Savings       Savings       Savings  
           Savings       Savings

\*\*           1                   2                   3                   4                   5  
           Impossible   Somewhat   No       Easier Than   Extremely  
                          Difficult   Difference   Others       Easy

Those who gave a negative response to the cost savings question stated that the requirements were not being used effectively. Two Manufacturing Directors felt that there was potential for significant cost savings once their programs were underway.

Understanding. Table 4.16 and 4.17 show that the VE program does not seem to be too difficult to understand.

Six out of the eleven Directors that responded, stated that the VE requirements and rules were at least easier than other requirement regulations. Those that stated that the VE program was difficult cited baseline requirement between the VE incentive clause and the mandatory clause as a major drawback. However, 6 Directors felt that the VE requirement was relatively straight forward.

#### Implementation and Administration Problems.

Of the 8 Manufacturing Directors that responded to this question, 3 stated that implementation was a problem and 5 had no opinion (Table 4.18). In a couple of cases, it was felt that the Engineering Division took on the primary responsibility of VE; therefore, it was not their responsibility. Many of the VE programs were not being used to its full capability. As shown in Table 4.18, similar responses were given for administrative issues.





Impact. Program Directors felt that VE had very little impact on their contract. In fact, 4 out of the 5 Program Directors interviewed stated that VE had little or no impact on their contract. Overall, the Manufacturing Directors also felt that VE had no impact on their contract. However, 4 Manufacturing Directors gave no opinion as to the impact of VE on their contract. Based on this information, it appears that neither Program or Manufacturing Directors think that VE is much of a factor on their contracts.

Technical Competence. Eleven out of the 13 respondents stated that they could go to their technical personnel for help. In this case, the Manufacturing Directors would refer to engineers, as well as their own personnel, as the technical people. One respondent used AFIT personnel to assess the value engineering process.

Concerns. Table 4.18 shows that some Manufacturing Directors felt that there were concerns by the contractor concerning VE. Three out of the 5 Manufacturing Directors stated they had received concerns from the contractor. Only 1 of the 5 Program Directors had received concerns from the contractor dealing with VE.

Contract administration offices did not issue many concerns to the Directors. Table 4.18 and 4.19 show that

the overall responses was that there were very few concerns voiced by the contract administration office. A few of the Manufacturing Directors stated that the contract administration office has very little or no input into the VE process.

Conclusion. From the Director's stand point, VE, as currently required, is relatively ineffective. While seven out of nine Directors determined that VE is in fact a cost saving measure, they also feel that there is room for improvement. Four out of six of the Manufacturing Directors stated that they had problems as a result of VE. The most prominent VE issue was the lack of clear direction when distinguishing between a VECF and an ECF. One Director stated that often VECFs are submitted on changes the contractor should make in-house as a normal course of business. Interestingly, when a contractor institutes his own VE program it is met with much success.

Once again, the Directors indicated that the technical personnel are quite competent for the VE requirements. Eleven out of thirteen Directors gave high marks to their VE technical personnel. VE did not seem to be a problem during implementation or administration of the program. However, it must be noted that many Directors did not have an aggressive VE program.

The Directors interviewed gave a variety of responses when asked to express additional observations relative to VE. One respondent felt that VE has outlived its usefulness and has an apparent overlap with producibility requirements. Others stated that it is primarily an engineering function of the SPO and does not have a strong impact on manufacturing.

General Cost Reduction Issues. The General Cost Reduction Issues section looked at the Directors perception of consolidating cost reduction programs or leaving them status quo. Directors were asked to determine whether certain elements that lead to consolidation would hamper or improve their programs. Table 4.20 shows the responses from the Manufacturing Directors and Table 4.21 shows the responses from the Program Directors.

**Table 4.20 - Manufacturing Directors Response to Consolidation**

GENERAL COST REDUCTION ISSUES*	1	2	3	4	5	MEAN
SINGLE FOCAL POINT WILL IMPROVE SAVINGS	-	-	2	6	2	4.00
CONSOLIDATION WILL HINDER PROGRAM	1	8	-	1	-	2.10
ONE SET OF RULES WILL IMPROVE SAVINGS	-	3	2	3	2	3.40
CURRENT PROGRAMS WORK WELL TO INCREASE SAVINGS	-	1	6	3	-	3.20

**Table 4.21 - Program Directors Responses to Consolidation**

GENERAL COST REDUCTION ISSUES*	1	2	3	4	5	MEAN
SINGLE FOCAL POINT WILL IMPROVE SAVINGS	1	-	-	3	1	3.60
CONSOLIDATION WILL HINDER PROGRAM	-	4	-	-	1	2.60
ONE SET OF RULES WILL IMPROVE SAVINGS	1	-	-	1	3	4.00

	1	2	3	4	5
	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree

Single Focal Point. Tables 4.20 and 4.21 show that twelve out of the fifteen Directors surveyed stated that a single focal point for cost reduction would improve savings on their program. However, among the interviewees that agreed with this statement, there were varying opinions on where the focal point should be located. Some of the

Directors in major SPO's felt that the focal point should be located in the SPO itself. Directors from some of the basket SPOs felt that a focal point, where all basket SPOs could use the cost reduction resources, would be advantageous to their programs. Others felt that when implementing a single focal point, care should be taken to avoid having duplication within the organization relative to cost reduction functions. Overall, the interviewees felt that the focal point must be strategically place within the organization in order to be effective. Two of the SPOs stated that their organization already has a single focal point for these programs in place.

Consolidating Programs. The same rationale used for having a single focal point was used for consolidating programs. In addition, it was noted that it would require a positive working relationship between all parties involved in the cost reduction process. It was also stated that it is important not to limit a consolidated effort to the three programs assessed in this research. Other programs that were identified as possible candidates for cost reduction include Multi-year Funding, Integrated Process Teams, and Work Measurement, as well as efforts at the higher levels as well. As can be seen in Table 4.20 and 4.21, thirteen of the fifteen respondents felt that consolidation would not

have a negative impact on their programs. In fact, the 2 Tables indicate that most Directors would realize a positive impact on their contract if consolidation was implemented.

Consolidating Rules and Regulations. Tables 4.20 and 4.21 shows that 9 of the fifteen Directors agreed that one set of rules for cost reduction would improve savings on their programs. Two of the Manufacturing Directors gave no opinion. One Director felt that having one set of rules would only cause problems since each cost reduction program has different objectives. For example, MANTECH concentrates on new technologies while IMIP deals primarily with capital investment. However, most agreed that, if done correctly, fewer rules could only help in creating a more effective cost reduction environment.

Current Programs. Manufacturing Directors were asked whether the current cost reduction programs work well on their current contract. Table 4.20 shows that most respondents had no opinion on the subject. Three of the Directors that did respond stated that the current cost reduction program does work well on their contract. Those that gave no opinion on the subject referenced previous issues within the interview.

Consolidation Impact. Once the Directors assessment of the consolidation issues were determined, an evaluation of individual elements were looked at to help narrow down where positive benefits could come from a consolidation. The Consolidation Impact looked at different potential outputs of a cost reduction program and evaluated the Directors perception of impact on each element.

Table 4.22 - Manufacturing Directors Responses to Consolidation Impact

CONSOLIDATING CRI IMPACT*	1	2	3	4	5	MEAN
RELATIVE TO COST	-	1	1	6	1	3.78
RELATIVE TO ADMINISTRATION	-	1	2	5	1	3.67
RELATIVE TO SCHEDULE	-	-	7	1	1	3.33
RELATIVE TO BUREAUCRACY	-	-	2	5	2	4.00
RELATIVE TO SAVINGS	-	-	2	6	1	3.89
RELATIVE TO IMPLEMENTATION	-	-	3	4	2	3.89
RELATIVE TO UNDERSTANDING	-	-	2	5	2	4.00

\*                   1                   2                   3                   4                   5  
Disastrous       Negative       No       Positive   Excellent  
Impact       Impact       Impact       Impact       Impact

Table 4.23 - Program Directors Responses to Consolidation Impact

CONSOLIDATING CRI IMPACT*	1	2	3	4	5	MEAN
RELATIVE TO COST	-	-	1	3	-	3.75
RELATIVE TO ADMINISTRATION	-	-	1	3	-	3.75
RELATIVE TO SCHEDULE	-	-	2	2	-	3.50
RELATIVE TO BUREAUCRACY	-	-	-	1	3	4.75
RELATIVE TO SAVINGS	-	-	-	4	-	4.00
RELATIVE TO IMPLEMENTATION	-	-	-	4	-	4.00
RELATIVE TO UNDERSTANDING	-	-	-	3	1	4.25

\*                    1                    2                    3                    4                    5  
Disastrous           Negative           No           Positive           Excellent  
Impact           Impact           Impact           Impact           Impact

They were to simply respond to how they perceived that a cost reduction initiative program would impact the elements in Tables 4.22 and 4.23.

Table 4.22 identified significant findings from the survey. Bureaucracy, understanding, savings and implementation have the highest scores from both the Program and Manufacturing Directors. Schedule, and administration have fewer positive scores. However, the overall inputs from the Directors indicate that there is a positive impact in most of the areas assessed.

**Effectiveness.** The next section of the survey was used to get the perception of the various Directors relative to the effectiveness of the major cost reduction programs.



Table 4.24 shows the responses given to the interviewer from the Manufacturing Directors. Table 4.25 shows the responses from the Program Directors.

Table 4.24 - Manufacturing Directors Responses to Effectiveness

PROGRAM EFFECTIVENESS*	1	2	3	4	5	MEAN
IMIP	-	1	-	4	1	3.83
MANTECH	-	-	1	4	-	3.40
VE	-	1	1	4	1	3.71

Table 4.25 - Program Directors Responses to Effectiveness

PROGRAM EFFECTIVENESS*	1	2	3	4	5	MEAN
IMIP	1	1	-	2	-	2.75
MANTECH	-	-	-	2	-	4.00
VE	1	-	2	2	-	3.00

\* 1 Very Ineffective 2 Ineffective 3 No Opinion 4 Effective 5 Very Effective

Other Manufacturing Programs. As expected, there were many different programs that were used to reduce manufacturing cost. Some Directors used one particular program extensively, while others would use a combination of many programs. Some of the programs that were used included: Integrated Process Teams, Work Measurement, Producibility, Component Breakout, Variability Reduction Program, Streamline Acquisitions, Design to Cost, Design to

Weight, Streamlining Contractual Requirements, and Quality Improvement Reviews. All of these programs were given a high degree of effectiveness by their respective Directors.

Conclusion. As evident in Tables 4.22 and 4.23, the overwhelming majority of Directors have determined that consolidating cost reduction initiatives would have a positive impact on each element evaluated in this section, except schedule. Nine out of eleven Directors have stated that schedule would have no impact should consolidation of cost reduction initiatives take effect. It is also clear that consolidating these major programs would help improve many of the elements that were assessed. At this point it should be made clear that a consolidation effort must be instituted with a common sense approach in order to be effective.

## V. Conclusions and Recommendations

### Introduction

The United States Air Force has several vehicles to facilitate cost savings on acquisitions. These programs are the Industrial Modernization Incentive Program (IMIP), the Manufacturing Technology Program (MANTECH), and the Value Engineering Program (VE). The B-2 System Program Office (SPO) sought to enhance the effectiveness of these three separate programs by combining them into one consolidated program.

First, this research was designed to explore the problems identified in current literature with each of the cost savings programs listed above. Second, the research was intended to explore the conditions that prompted the B-2 to consolidate its cost savings program into one comprehensive vehicle and, the pros and cons of this consolidation. Finally, using the problems identified in the current literature and the problems that led the B-2 to consolidate, the perceptions of Air Force program and manufacturing directors towards the problems with current cost savings and the impact of a consolidation of these programs was gathered.

In this chapter, based on the respondents answers to the interview questions, conclusions to the investigative

questions stated in chapter one will be made. In addition, recommendations for further study will also be discussed.

#### Investigative Question #1

What problems are identified in the current literature with each of the Air Force cost savings programs?

IMIP was the first program reviewed. This review identified several problems with the use of IMIP. The first major problem was the lack of ability to validate IMIP project savings. There appears to be no clear, consistent guidelines to direct managers as to how to account for and understand program savings. A second problem identified with IMIP was the long length between IMIP program phases. These long delays between program phases demotivates contractors and reduce savings possibilities. A third concern with IMIP was the lack of consistent guidance for program implementation and use. There appears to be a need for centralization of policy and guidance along with standardization of IMIP procedures. A final problem with IMIP is the lack of high level support. There is no high ranking champion for IMIP to push its use.

The MANTECH program has experience problems also. The first problem identified in the literature was the general lack of understanding of the program by the contracting community. This lack of understanding is compounded through complicated MANTECH procedures. A second concern with

MANTECH is the uncertainty of program funding. Funding delays can cause the stretchout of projects or descoping which have negative impacts on savings. A third concern with MANTECH, that is similar to IMIP, is the lack of consistent guidance on how to effectively validate savings of projects without consuming the project savings in the process. Also the use of traditional IMIP type validation techniques hinder MANTECH. IMIP compares the "as is" condition to the "to be" condition to determine savings. In MANTECH, which often pioneers new technologies, the "as is" condition is hard to identify. A final concern with MANTECH is the need to enhance technology transfer of data the Air Force has rights to. If this transfer is enhanced, it can help better spread new innovations and decrease duplication.

Like IMIP and MANTECH, Value Engineering has problems identified in the current literature. The initial problem identified in the literature with VE was the lack of any high level support for the VE program. Like IMIP, there is no high ranking champion to push the use of VE. Again, similar to IMIP, the VE program experiences problems with long delays in program phases. Also identified as a VE problem was the complexity of the contractual language that governs the program. The lack of funding by program managers has also hindered the effectiveness of VE. In addition to funding problems and contractual complexity, VE

must fight the problem that VE proposals will reduce the size of the contracted effort which would eventually reduce the profit margin for the contractor. A final problem identified with VE is the lack of training for both government and contractor personnel in the implementation and use of Value Engineering.

#### Investigative Question #2

What were the conditions that surrounded the B-2's effort to consolidate its cost savings programs, including motivation, implementation problems and results?

The B-2 program was faced with a unique situation. The B-2 was the most costly acquisition the Department of Defense had ever undertaken. To counter this high cost, the SPO had certified to Congress savings figures that would be achieved by cost savings programs. These savings goals were then used by Congress to reduce the B-2 budget by the same amount. Therefore, the B-2 had to make the savings goals or bust the budget. In order to help meet these goals, the B-2 SPO consolidated its cost savings programs into one activity with common ground rules and assumption and with a single goal of reducing the cost of the program.

Initially, the B-2 had functioning IMIP, MANTECH, and VE programs. The effectiveness of these programs on the B-2 could not be accurately gauged because of the early phase the program was in when the consolidation was initiated.

Also, it was difficult to determine the history of these programs because of the lack of historical data that is characteristic of classified programs.

The B-2 executed this consolidation to take advantage of the efficiencies of operating one savings program rather than three separate activities with separate rules and processes to help meet its savings goals. This new consolidation would allow the B-2 program to take advantage of any savings opportunity and not just those projects that fit into the IMIP, MANTECH, and VE structures. The consolidation also eliminated the confusion between programs as to where a project would fit in the cost savings environment.

There were several results of this consolidation. Cost savings personnel were dropped from three individuals down to one. No personnel were lost from the SPO but rather reassigned to activities that were in need of attention. The consolidation also appeared to have resulted in better program guidance. The SPO no longer needed to manage three separate programs. The number of pages of cost savings guidance dropped from 240 down to 15. Individuals were made more aware of their ability to affect cost savings and had a better understanding of the program in general. This was all a result of having one program rather than three which received high level visibility and support. The

consolidation also apparently resulted in increased savings and project totals because of the program's unique ability to capture the savings from any proposal, not just IMIP, MANTECH, and VE.

There were several benefits associated with the B-2's consolidation program. First, the new effort eliminated the separate and confusing burden of administering three separate programs rather than one. Second, the new program allowed savings to be captured from any good idea, not just IMIP, MANTECH, or VE. Finally the consolidation provided one high level focal point for cost savings at both the SPO and the contractor. This focal point helped to greatly enhance visibility and publicity of the program.

There were several problems also associated with the consolidation. The first problem identified was the normal growing pains of instituting a new system. These growing pains were perceived as inevitable with the change. The second problem was that the separate empires of IMIP, MANTECH, and VE were dissolved in the consolidation. There was resistance from each of these organizations to give up control. A final problem generated by the B-2's consolidation was that savings goals predicted by the SPO were used by Congress to reduce the B-2 budget by the same amount. This put the B-2 in the position of having to make the savings goals or exceed their congressional budget.



### Investigative Question #3

Are the problems with cost savings programs identified in the literature review confirmed by Air Force program and manufacturing directors on current cost savings programs, and would these directors support or resist a consolidation of cost savings efforts on their programs?

Problems identified in the literature review were, indeed, confirmed by the Air Force program and manufacturing directors within ASC. These problems range from lack of funding to complex and difficult procedures for applying the cost reduction contract to a major acquisition. The largest issue that was presented to the research team was funding. Despite the potential savings that could be realized through up-front investment, many cost reduction programs must be shelved due to a lack of support and money. Another important issue was the complexity of some of the programs. IMIP requires a detailed estimate of potential savings in order to justify a project as a candidate for IMIP funds. In addition, the project must show a potential for a high rate of return. This caused extensive work and documentation on the part of the contractor and the government. The rules and regulations for many cost reduction programs must be simplified in order for them to achieve the objective of reducing overall cost of a weapon system. Many of these programs do not consider the administrative cost on the government to fulfill the regulatory requirements. Often times, it is felt that the

government loses much of its cost savings due to the administrative burden that the regulations place on government officials and contractor personnel.

Some programs do not have the continuity it needs to maximize the potential benefit that could be realized by major contracting organizations. An example is the MANTECH program that is used in a multitude of federal agencies. Consolidating this effort could save the government money in Research and Development cost by avoiding duplication.

Another issue that was brought up among several of the Directors is the continuous change in quantities. This can have a negative effect on cost savings, as was realized on the B-2 program. A commitment to produce a set quantity of items at the front end of the program would be instrumental in the reduction of unit cost.

Some of the cost reduction programs are relatively ineffective in today's contracting environment. While the government wants to encourage cost reduction within the major DoD contracting facilities, some programs such as VE have not appeared to be work on some programs. The intent of VE is still a useful tool for cost reduction, however the government needs to find ways to encourage the contractor to be cost effective in the front-end of the acquisition cycle. According to this research survey, VE is not working.

The survey clearly concludes that a consolidation

effort of cost reduction programs is an innovative way to effect changes in the way Program Offices do business. But there also needs to be some clarification on what a consolidated effort would involve. Because of the need for hands-on monitoring of the program, the government cannot afford to consolidate cost reduction at the ASC level. It must go into the SPO's and establish an organization to assist contracting personnel with the authority to make changes in the requirements that are put on Air Force contracts. It was also clear from the survey responses, that adding an organization or taking away from current organization could be catastrophic to the cost reduction process.

The cost reduction process should work to ease the burden on government and contractor personnel. At the same time there must be enough oversight to insure that the intent of the cost reduction programs are being met by the contractor.

When the respondents were asked as to whether a consolidation of cost reduction programs would impact their contract, almost every Director stated that it would have at least a positive impact on their contract. The majority of Directors determined that consolidating cost reduction initiatives would have a positive impact in many areas of the acquisition process. The idea is that by consolidating

the efforts of cost reduction, the Program and Manufacturing Directors could work with the cost reduction focal point to determine which program would be best for the situation that is being proposed. The cost reduction efforts could lead to new programs and could tailor the efforts to the needs of the program office and their respective contractors. However, it must be emphasized that the consolidation initiative must be organized in a "common sense" way to insure its success.

An important observation that was identified in the survey is that there are already a number of cost reduction programs within ASC. Each SPO has their own way of doing cost reduction in manufacturing. Each Director also believes that their program is the best. It is generally felt that having a consolidated cost reduction program of some sort is the way of the future.

#### Recommendations for Further Research

Some recommendations for areas of further research are as follows:

- Conduct similar research involving other Material Command Centers, including buying office and logistic centers.
- Conduct similar research into the Army and Navy Program Offices using a similar research format.
- Conduct similar research involving other functional

areas, within Air Force buying offices, that have a cost savings input.

-- Conduct research into the potential consolidation of MANTECH and IMIP projects into one "user friendly" database from all Federal agencies.

-- Conduct similar research into the DoD contractor perspective of consolidating cost reduction programs.

Continued research will eventually provide short and long term cost savings to the organizations that use this research and to the United States government.

-- Conduct research to determine whether each program office should do its own consolidation effort or use one consolidation pattern for within ASC and/or other buying agencies.

### Conclusions

It is apparent from this research that there are problems associated with each of the separate cost savings programs. The B-2 SPO recognized these problems and sought a more efficient way to generate program savings. Their solution was to consolidate the separate cost savings programs into one common effort directed at saving program dollars. From our research, this program has been determined to be successful in generating additional savings beyond the initial effort. The interviews from the various

Manufacturing and Program Directors have validated the need for a consolidated effort and most of the problems identified in Chapter II.

The research has also indicated that a consolidation should be implemented to streamline requirements and push for better methods of savings contract dollars.

## Appendix A. Interview Questions

### B-2 Case Study Interview Questions

1. What factors led the B-2 to consolidate its cost savings programs? Why were these factors important?

The following three question apply to prior to the consolidation. On a scale of one to five with one being strongly agree and five being strongly disagree, how would you respond to the following questions?

2. Standard cost savings programs were ineffective on the B-2 program. 1 2 3 4 5 Why?

3. Cost savings programs were confusing prior to the consolidation. 1 2 3 4 5 Why?

4. Cost savings had a high priority on the B-2 program. 1 2  
3 4 5  
Why?

5. Can you think of any other reasons that led to the B-2's consolidation of cost savings programs?

6. How did the number of administrative personnel assigned to manage the B-2's cost savings programs change after the consolidation?

7. Did the B-2 cost savings consolidation result in better program guidance? In what way?

On a scale of one to five with one being strongly agree and five being strongly disagree, how would you respond to the following three questions?

8. The number of pages of guidance was reduced after consolidation. 1 2 3 4 5 Why?

9. Awareness of individual's ability to effect cost reduction after consolidation was increased. 1 2 3 4 5 Why?

10. Ease of understanding the program was enhanced through consolidation. 1 2 3 4 5 Why?

11. Can you think of any other ways the consolidation affected program guidance?



12. Did the B-2 consolidation of cost savings programs generated greater numbers of projects submitted for consideration? Why do you think this? How do you know?

13. Did the B-2 consolidation of cost savings programs increase savings beyond what the separate individual programs would have produced? Why?

14. List the five most important benefits the B-2 cost reduction program consolidation produced in order of importance. Why were each of these important?

15. List the five most significant problems the B-2 cost reduction program consolidation produced in order of importance. Why did each one represent a problem?

Data Points Gathered from the B-2 SPO

1. Cost reduction administrative personnel prior to consolidation

2. Cost reduction administrative personnel after to consolidation

3. Total cost reduction for three years prior to consolidation vs program budget for each year.

4. Total cost reduction for three years after consolidation vs program budget for each year.

5. Total number of projects submitted prior to consolidation
6. Total number of projects submitted to current date after consolidation
7. Pages of applicable guidance prior to consolidation
8. Pages of applicable guidance after consolidation.

## Manufacturing Manager Survey

I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT THE VARIOUS MANUFACTURING COST REDUCTION INITIATIVES ON YOUR PROGRAM. SECTION I OF THE SURVEY WILL DEAL WITH QUESTIONS CONCERNING YOUR EXPERIENCE. SECTION II WILL ASSESS THE INDUSTRIAL MODERNIZATION INCENTIVE PROGRAM (IMIP). SECTION III WILL LOOK AT THE MANUFACTURING TECHNOLOGY PROGRAM (MANTECH) AND SECTION IV WILL LOOK AT VALUE ENGINEERING (VE). FINALLY, SECTION V WILL DEAL WITH QUESTIONS CONCERNING GENERAL COST REDUCTION ISSUES.

### SECTION I

What is your job title?

How many total years of program experience do you have?

How many years, if any, have you dealt with IMIP?

How many years, if any, have you dealt with MANTECH?

How many years, if any, have you dealt with VE?

### SECTION II

THE SECOND SECTION WILL LOOK AT THE INDUSTRIAL MODERNIZATION INCENTIVE PROGRAM OR IMIP.

#### INDUSTRIAL MODERNIZATION INCENTIVE PROGRAM:

- |                                                                                                                          |            |          |
|--------------------------------------------------------------------------------------------------------------------------|------------|----------|
| 1.) Is IMIP used on your current program?<br>(If not, then go to Section III).                                           | Yes        | No       |
| 2.) What are the benefits that are realized from the IMIP program?                                                       |            |          |
| 3.) Are the benefits from IMIP worth the cost incurred?<br>Why?                                                          | Yes        | No       |
| 4.) Have you encountered any problems on your program, as a result of the IMIP?<br>(If so, have they all been resolved?) | Yes<br>Yes | No<br>No |

THE NEXT TWO QUESTIONS CONCERNING IMIP, SHOULD BE RANKED ON A SCALE OF 1 TO 5. THE SCALES ACCOMPANY THE QUESTIONS.  
(Blue Card)

- |                                                           |   |   |   |   |   |
|-----------------------------------------------------------|---|---|---|---|---|
| 5.) How would you rate the IMIP relative to cost savings? | 1 | 2 | 3 | 4 | 5 |
|-----------------------------------------------------------|---|---|---|---|---|

Cost Greatly Exceed Savings	Cost Exceed Savings	No Savings Break-Even	Moderate Savings	Significant Savings
1-----	2-----	3-----	4-----	5-----

6.) (If answer to the above question is 1, 2, or 3, then why are there no savings?)

7.) How complicated is the IMIP program?  
(i.e. is it easy to understand?)  
(Green Card)

Impossible	Somewhat Difficult	Same as Others	Easier than Others	Extremely Simple
1-----	2-----	3-----	4-----	5-----

Why?

FOR THE NEXT SIX QUESTIONS, PLEASE GIVE YOUR OPINION, USING THE FOLLOWING SCALE: (Orange Card)

Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
1-----	2-----	3-----	4-----	5-----

8.) I have experienced very few problems  
implementing IMIP.

1 2 3 4 5

9.) I have experienced very few problems  
administering IMIP.

1 2 3 4 5

10.) IMIP has very little impact on my contract.

1 2 3 4 5

11.) What I don't know about IMIP, I can find out  
from my technical people.

1 2 3 4 5

12.) I have received very few concerns from the  
contractor dealing with the implementation  
or administration of IMIP.

1 2 3 4 5

13.) I have received very few concerns from the contract  
administration office dealing with IMIP.

1 2 3 4 5

14.) PLEASE EXPRESS ANY OBSERVATIONS YOU MAY HAVE ABOUT THE  
IMIP PROCESS THAT HAVE NOT BEEN EXPRESSED ALREADY.

### SECTION III

THIS SECTION ASSESSES THE MANUFACTURING TECHNOLOGY PROGRAM.  
MANUFACTURING TECHNOLOGY PROGRAM:

1.) Is MANTECH used on your current program? Yes No  
(If not, then go to Section IV).

2.) What are the benefits that are realized from the  
MANTECH program?

3.) Are the benefits from MANTECH worth the cost  
incurred? Yes No

Why?

4.) Have you encountered any problems on your  
program, as a result of the MANTECH? Yes No  
(If so, have they all been resolved?) Yes No

THE NEXT TWO QUESTIONS CONCERNING MANTECH, SHOULD BE RANKED  
ON A SCALE OF 1 TO 5. THE SCALES ACCOMPANY THE QUESTIONS.  
(Blue Card)

5.) How would you rate the MANTECH relative to 1 2 3 4 5  
cost savings?

Cost Greatly Exceed Savings	Cost Exceed Savings	No Savings	Moderate Savings	Significant Savings
1-----	2-----	3-----	4-----	5-----

6.) (If answer to the above question is 1, 2, or 3,  
then why are there no savings?)

7.) How complicated is the MANTECH program? 1 2 3 4 5  
(i.e. is it easy to understand?)  
(Green Card)

Impossible	Somewhat Difficult	Same as Others	Easier than Others	Extremely Simple
1-----	2-----	3-----	4-----	5-----

Why?

FOR THE NEXT SIX QUESTIONS, PLEASE GIVE YOUR OPINION, USING  
THE FOLLOWING SCALE: (Orange Card)

Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
1-----	2-----	3-----	4-----	5-----

- 8.) I have experienced very few problems  
implementing MANTECH. 1 2 3 4 5
- 9.) I have experienced very few problems  
administering MANTECH. 1 2 3 4 5
- 10.) MANTECH has little impact on my contract. 1 2 3 4 5
- 11.) What I don't know about MANTECH, I can find out  
from my technical people. 1 2 3 4 5
- 12.) I have received very few concerns from the  
contractor dealing with the implementation  
or administration of MANTECH. 1 2 3 4 5
- 13.) I have received very few concerns from the  
contract administration office dealing  
with MANTECH. 1 2 3 4 5
- 14.) PLEASE EXPRESS ANY OBSERVATIONS YOU MAY HAVE ABOUT THE  
MANTECH PROCESS THAT HAVE NOT BEEN EXPRESSED ALREADY.

#### SECTION IV

THIS SECTION LOOKS AT VALUE ENGINEERING OR VE.  
VALUE ENGINEERING:

- 1.) Is VE used on your current program? Yes No  
(If not, then go to Section V).
- 2.) What are the benefits that are realized from the  
VE program?
- 3.) Are the benefits from VE worth the cost  
incurred? Yes No
- Why?
- 4.) Have you encountered any problems on your  
program, as a result of the VE? Yes No  
(If so, have they all been resolved?) Yes No

THE NEXT TWO QUESTIONS CONCERNING VE, SHOULD BE RANKED ON A SCALE OF 1 TO 5. THE SCALES ACCOMPANY THE QUESTIONS. (Blue Card)

- 5.) How would you rate the VE relative to cost savings? 1 2 3 4 5

Cost Greatly Exceed Savings	Cost Exceed Savings	No Savings	Moderate Savings	Significant Savings
1-----	2-----	3-----	4-----	5

- 6.) (If answer to the above question is 1, 2, or 3, then why are there no savings?)

- 7.) How complicated is the VE program? (i.e. is it easy to understand?) (Green Card) 1 2 3 4 5

Impossible Difficult	Somewhat Others	Same as Others	Easier than Simple	Extremely
1-----	2-----	3-----	4-----	5

Why?

FOR THE NEXT SIX QUESTIONS, PLEASE GIVE YOUR OPINION, USING THE FOLLOWING SCALE: (Orange Card)

Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
1-----	2-----	3-----	4-----	5

- 8.) I have experienced very few problems implementing VE. 1 2 3 4 5
- 9.) I have experienced very few problems administering VE. 1 2 3 4 5
- 10.) VE has very little impact on my contract. 1 2 3 4 5
- 11.) What I don't know about VE, I can find out from my technical people. 1 2 3 4 5
- 12.) I have received very few concerns from the contractor dealing with the implementation or administration of VE. 1 2 3 4 5

13.) I have received very few concerns from the contract administration office dealing with VE.

1 2 3 4 5

14.) PLEASE EXPRESS ANY OBSERVATIONS YOU MAY HAVE ABOUT THE VE PROCESS THAT HAVE NOT BEEN EXPRESSED ALREADY.

#### SECTION V

THIS IS THE FINAL SECTION. IN THIS SECTION I WILL ASK QUESTIONS CONCERNING GENERAL COST REDUCTION PROGRAM ISSUES. EACH QUESTION IN THIS SECTION WILL BE RATED ON A SCALE OF 1 TO 5.

THE FIRST SCALE THAT WILL BE USED IN THIS SECTION WILL LOOK LIKE THIS. (Orange Card)

Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
1-----	2-----	3-----	4-----	5-----

1.) Having a single focal point for all the cost savings programs would help improve manufacturing cost savings.  
Explain your answer.

1 2 3 4 5

2.) Consolidating manufacturing programs would only hinder the cost objectives of my program  
Explain your answer.

1 2 3 4 5

3.) Having one set of rules and regulations for cost reduction would help improve cost savings.  
Explain your answer.

1 2 3 4 5

4.) The current manufacturing cost savings programs work well to increase savings on my program.  
Explain your answer.

1 2 3 4 5



USE THE FOLLOWING SCALE TO ANSWER THE QUESTIONS BELOW. YOU MAY ELABORATE ON EACH OF YOUR RESPONSES AS NEEDED. (Brown Card)

Disastrous Impact	Negative Impact	No Impact	Positive Impact	Excellent Impact
1-----	2-----	3-----	4-----	5

5.) Consolidating the cost reduction initiatives on my contract will impact my program relative to:

Cost	1	2	3	4	5
Administration	1	2	3	4	5
Schedule	1	2	3	4	5
Bureaucracy	1	2	3	4	5
Increased Savings	1	2	3	4	5
Implementation	1	2	3	4	5
Understanding of Rules	1	2	3	4	5

6.) Are there any other manufacturing cost reduction programs on your contract? If so, what are they?

Are they effective?

Why?

7.) Using the scale below, how would you rate the overall effectiveness of the following cost reduction programs? (Red Card)

Very Ineffective	Ineffective	No Opinion	Effective	Very Effective
1-----	2-----	3-----	4-----	5

IMIP	1	2	3	4	5
MANTECH	1	2	3	4	5
VE	1	2	3	4	5
_____	1	2	3	4	5
_____	1	2	3	4	5

7.) PLEASE EXPRESS ANY OBSERVATIONS YOU MAY HAVE ABOUT GENERAL COST REDUCTION PROGRAMS THAT HAVE NOT BEEN EXPRESSED ALREADY.

## Program Director Survey

I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT THE VARIOUS MANUFACTURING COST REDUCTION INITIATIVES ON YOUR PROGRAM. SECTION I OF THE SURVEY WILL DEAL WITH QUESTIONS CONCERNING YOUR EXPERIENCE. SECTION II WILL ASSESS THE INDUSTRIAL MODERNIZATION INCENTIVE PROGRAM (IMIP). SECTION III WILL LOOK AT THE MANUFACTURING TECHNOLOGY PROGRAM (MANTECH) AND SECTION IV WILL LOOK AT VALUE ENGINEERING (VE). FINALLY, SECTION V WILL DEAL WITH QUESTIONS CONCERNING GENERAL COST REDUCTION ISSUES.

### SECTION I

What is your job title?

How many total years of program experience do you have?

How many years, if any, have you dealt with IMIP?

How many years, if any, have you dealt with MANTECH?

How many years, if any, have you dealt with VE?

### SECTION II

THE SECOND SECTION WILL LOOK AT THE INDUSTRIAL MODERNIZATION INCENTIVE PROGRAM OR IMIP.

INDUSTRIAL MODERNIZATION INCENTIVE PROGRAM:

THESE NEXT TWO QUESTIONS CONCERNING IMIP, SHOULD BE RANKED ON A SCALE OF 1 TO 5. THE SCALES ACCOMPANY THE QUESTIONS. (Blue Card)

- 1.) How would you rate the IMIP relative to cost savings? 1 2 3 4 5

Cost Greatly Exceed Savings	Cost Exceed Savings	No Savings Break-Even	Moderate Savings	Significant Savings
1-----	2-----	3-----	4-----	5-----

- 2.) How complicated is the IMIP program? (i.e. is it easy to understand?) 1 2 3 4 5  
(Green Card)

Impossible	Somewhat Difficult	Same as Others	Easier than Others	Extremely Simple
1-----	2-----	3-----	4-----	5-----

FOR THE NEXT SIX QUESTIONS, PLEASE GIVE YOUR OPINION, USING THE FOLLOWING SCALE: (Orange Card)

Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
1-----	2-----	3-----	4-----	5

- 3.) IMIP has very little impact on my contract. 1 2 3 4 5
- 4.) What I don't know about IMIP, I can find out from my technical people. 1 2 3 4 5
- 5.) I have received very few concerns from the contractor dealing with the implementation or administration of IMIP. 1 2 3 4 5
- 6.) I have received very few concerns from the contract administration office dealing with IMIP. 1 2 3 4 5

### SECTION III

THIS SECTION ASSESSES THE MANUFACTURING TECHNOLOGY PROGRAM.

MANUFACTURING TECHNOLOGY PROGRAM:

THESE NEXT TWO QUESTIONS CONCERNING MANTECH, SHOULD BE RANKED ON A SCALE OF 1 TO 5. THE SCALES ACCOMPANY THE QUESTIONS. (Blue Card)

- 1.) How would you rate the MANTECH relative to cost savings? 1 2 3 4 5

Cost Greatly Exceed Savings	Cost Exceed Savings	No Savings	Moderate Savings	Significant Savings
1-----	2-----	3-----	4-----	5

- 2.) How complicated is the MANTECH program? (i.e. is it easy to understand?) (Green Card) 1 2 3 4 5

Impossible	Somewhat Difficult	Same as Others	Easier than Others	Extremely Simple
1-----	2-----	3-----	4-----	5

FOR THE NEXT SIX QUESTIONS, PLEASE GIVE YOUR OPINION, USING THE FOLLOWING SCALE: (Orange Card)

Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
1-----	2-----	3-----	4-----	5

- 3.) MANTECH has little impact on my contract. 1 2 3 4 5
- 4.) What I don't know about MANTECH, I can find out from my technical people. 1 2 3 4 5
- 5.) I have received very few concerns from the contractor dealing with the implementation or administration of MANTECH. 1 2 3 4 5
- 6.) I have received very few concerns from the contract administration office dealing with MANTECH. 1 2 3 4 5

#### SECTION IV

THIS SECTION LOOKS AT VALUE ENGINEERING OR VE.

VALUE ENGINEERING:

THESE NEXT TWO QUESTIONS CONCERNING VE, SHOULD BE RANKED ON A SCALE OF 1 TO 5. THE SCALES ACCOMPANY THE QUESTIONS. (Blue Card)

- 1.) How would you rate the VE relative to cost savings? 1 2 3 4 5

Cost Greatly Exceed Savings	Cost Exceed Savings	No Savings	Moderate Savings	Significant Savings
1-----	2-----	3-----	4-----	5

- 2.) How complicated is the VE program? (i.e. is it easy to understand?) 1 2 3 4 5  
(Green Card)

Impossible	Somewhat Difficult	Same as Others	Easier than Others	Extremely Simple
1-----	2-----	3-----	4-----	5

FOR THE NEXT SIX QUESTIONS, PLEASE GIVE YOUR OPINION, USING THE FOLLOWING SCALE:

Strongly	Disagree	No Opinion	Agree	Strongly
Disagree				Agree
1-----	2-----	3-----	4-----	5

- 3.) VE has very little impact on my contract. 1 2 3 4 5
- 4.) What I don't know about VE, I can find out from my technical people. 1 2 3 4 5
- 5.) I have received very few concerns from the contractor dealing with the implementation or administration of VE. 1 2 3 4 5
- 6.) I have received very few concerns from the contract administration office dealing with VE. 1 2 3 4 5

#### SECTION V

IN THIS FINAL SECTION, I WILL ASK QUESTIONS CONCERNING GENERAL COST REDUCTION PROGRAM ISSUES. THE FIRST SCALE THAT WILL BE USED IN THIS SECTION WILL LOOK LIKE THIS. (Orange Card)

Strongly	Disagree	No Opinion	Agree	Strongly
Disagree				Agree
1-----	2-----	3-----	4-----	5

- 1.) Having a single focal point for all the cost savings programs would help improve manufacturing cost savings. 1 2 3 4 5
- 2.) Consolidating manufacturing programs would only hinder the cost objectives of my program. 1 2 3 4 5
- 3.) Having one set of rules and regulations for cost reduction would help improve cost savings. 1 2 3 4 5

USE THE FOLLOWING SCALE TO ANSWER THE QUESTIONS BELOW. YOU MAY ELABORATE ON EACH OF YOUR RESPONSES AS NEEDED. (Brown Card)

Disastrous Impact	Negative Impact	No Impact	Positive Impact	Excellent Impact
----------------------	--------------------	--------------	--------------------	---------------------

1-----2-----3-----4-----5

5.) Consolidating the cost reduction initiatives  
on my contract will impact my program relative to:

Cost	1	2	3	4	5
Administration	1	2	3	4	5
Schedule	1	2	3	4	5
Bureaucracy	1	2	3	4	5
Increased Savings	1	2	3	4	5
Implementation	1	2	3	4	5
Understanding of Rules	1	2	3	4	5

6.) Using the scale below, how would you rate the overall  
effectiveness of the following cost reduction programs? (Red  
Card)

Very Ineffective	Ineffective	No Opinion	Effective	Very Effective
1-----	2-----	3-----	4-----	5

IMIP	1	2	3	4	5
MANTECH	1	2	3	4	5
VE	1	2	3	4	5

## Appendix B. Interview Participants

### B-2 Case Study Respondents

1. Campbell, Lt Col John. Deputy Director of Manufacturing, C-17 System Program Office. AFMC/ASC, Wright Patterson AFB OH 45433.
2. Evans, Tom. Manufacturing Division Chief, ASC/YSM, Wright Patterson AFB OH 45433.
3. Gillottie, Frederick. B-2 Contracting, ASC/YSK, Wright Patterson AFB OH 45433.
4. Harstad, Richard. Deputy Director Manufacturing, ASC/YSM, Wright Patterson AFB OH 45433.
5. Hepler, Capt Steve. B-2 CRI Program Manager, ASC/YSM, Wright Patterson AFB OH 45433.
6. Hines, Kathy. B-2 CRI Production Support, ASC/YSM, Wright Patterson AFB OH 45433.
7. Huffman, Capt Charles. B-2 CRI Support, ASC/YSM, Wright Patterson AFB OH 45433.
8. Richie, Stanley. B-2 Director of Program Control, ASC/YSP, Wright Patterson AFB OH 45433.
9. Weisert, Col Donald. B-2 Director of Logistics, ASC/YSL, Wright Patterson AFB OH 45433.
10. White, Tony. B-2 CRI Pricing Support, ASC/Pricing Center, Wright Patterson AFB OH 45433.
11. Zacchero, Maj Charles. Chief of Manufacturing, ASC/VCDM, Wright Patterson AFB OH 45433.

### Manufacturing Directors Surveyed

1. Chabannes, Rene. F-16 Acting Manufacturing Director, ASC/YFD, Wright Patterson AFB OH 45433.
2. Ferrell, David. Subsystems Manufacturing Director, ASC/SDXD, Wright Patterson AFB OH 45433.
3. Geisler, Roy. Lantirn Manufacturing Director, ASC/VLD, Wright Patterson AFB OH 45433.

4. Kosmal, Brian. C-17 Manufacturing Director, ASC/YCD, Wright Patterson AFB OH 45433.
5. Kuhlke, Karl. Advanced Cruise Missile Manufacturing Director, ASC/VCD, Wright Patterson AFB OH 45433.
6. Martyr, J.P. Training Manufacturing Director, ASC/YTD, Wright Patterson AFB OH 45433.
7. Reed, Jon. F-22 Manufacturing Director, ASC/YFD, Wright Patterson AFB OH 45433.
8. Stamp, Lt Col John. Systems Manufacturing Director, ASC/SDED, Wright Patterson AFB OH 45433.
9. Williams, Lt Col Gary. Electronic Combat & Reconnaissance Manufacturing Director, ASC/RWD, Wright Patterson AFB OH 45433.
10. Vanatsky, Ronald. NASP Manufacturing Director, ASC/NAXM, Wright Patterson AFB OH 45433.

Program Directors Surveyed

1. Bolton, C.M. Col. Advanced Cruise Missile Program Director, ASC/VC, Wright Patterson AFB OH 45433.
2. Cunningham, J.A. Lantirn Program Director, ASC/VL, Wright Patterson AFB OH 45433.
3. Graves, J.T. F-22 Deputy Program Director, ASC/YF, Wright Patterson AFB OH 45433.
4. Hollingworth, Col. Electronic Combat & Reconnaissance Deputy Program Director, ASC/RW, Wright Patterson AFB OH 45433.
5. Sliper, M.L. Col. F-16 Deputy Program Director, ASC/YP, Wright Patterson AFB OH 45433.



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### Vita

Capt Joseph H. Donohoe was born on 25 September 1956 at Hamilton AFB, California and graduated from Escambia High School in Pensacola, Florida in 1974. He then enlisted in the Air Force as an Avionic Specialist in 1978. For 3 years, he worked on KC-135 and transient aircraft at RAF Mildenhall, UK. He left for Pope AFB, North Carolina in 1982 to work on C-130's. During his off-duty time, he attended Southern Illinois University and received a Bachelor of Science Degree in Industrial Technology. In October 1985, Captain Donohoe received a commission through Officers Training School. His first commissioned assignment was as a Production Officer at Det 10 of the Air Force Contract Management Division. There, he insured contractual compliance of 150 DoD contracts worth over \$8 billion at the Martin-Marietta Denver facility. He was later chosen to serve as the Deputy Division Chief for Manufacturing. In 1988, he was reassigned to the 3440th Technical Training Group at Lowry AFB, Colorado. There he trained over 250 students in the fundamentals of major weapons system contracting, quality and program acquisition. In 1991 he was selected for the Air Force Institute of Technology and received a Master of Science Degree in Contract Management.

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### Vita

Captain Mark A. Hobson was born on 9 Feb 1959 at Andrews Air Force Base, Maryland. He graduated from Apollo High School in Owensboro, Kentucky in 1977. Upon graduation, he entered the University of Western Kentucky in Bowling Green, Kentucky and earned degrees in Elementary and Special Education. He then taught elementary special education for four years in New Mexico and Kentucky. He received his commission in the United States Air Force as a distinguished graduate from the Air Force's Officer Training School on 3 July, 1985. Upon graduation, he was assigned to the Air Force Presidential Honor Guard at Washington D.C. as the Officer-In-Charge of the Air Force Drill Team until 13 October, 1987. During this time, Captain Hobson attended Squadron Officers School in residence. He was then assigned to the Aeronautical Systems Division (ASD), Electronic Combat Reconnaissance System Program Office (SPO) at Wright Patterson AFB, OH as a manufacturing manager until April 1988. He was then assigned to the ASD B-2 SPO as a manufacturing manager until 22 May, 1991. He entered the Air Force Institute of Technology on 23 May 1991.

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# REPORT DOCUMENTATION PAGE

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